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TENNESSEE. BUREAU OF LABOR,
STATISTICS & MINES

FIFTH ANNUAL REPORT

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FIFTH

ANNUAL REPORT

OF THE

Bureau of Labor, Statistics and Mines

TO THE

GOVERNOR AND FIFTIETH GENERAL ASSEMBLY

OF THE

STATE OF TENNESSEE.

JANUARY, 1896.

NASHVILLE, TENN.:
FRANC. M. PAUL, PRINTER TO THE STATE.
1896.

N. Y. P. Lib. Apr.'24

STATE OF TENNESSEE.

LETTER OF TRANSMITTAL.

BUREAU OF LABOR, STATISTICS AND MINES.

NASHVILLE, TENN., February 12, 1896.

To His Excellency, PETER TURNEY, *Governor of Tennessee:*

SIR—I have the honor of submitting to you, and through you to the Fiftieth General Assembly, the fifth annual report of the Bureau of Labor, Statistics and Mines, covering the calendar year 1895.

On entering upon the duties of this office May 15, 1895, no record of inspections was found from January 1 to May 15, consequently this report covers what has been accomplished since my appointment.

The disastrous calamity at Dayton, Tenn., December 20, 1895, and the difficulty experienced in obtaining annual reports from the mine operators, has delayed the report.

Legislation compelling the answering and filing of these reports is necessary.

I trust that it will prove satisfactory to you, that the condition of many of the mines in the State has been greatly improved, while in others the work of improvement is being accomplished as rapidly as possible.

Operators who have heretofore paid very slight attention to the mining statutes, have expressed a desire to comply with these Acts in every particular.

The condition of the laboring classes in this State has not been treated as fully as it deserves, but it is impossible for this Bureau to gather authentic statistics with the force and appropriation allowed by the Legislature, especially in absence of laws requiring proper reports to the Bureau.

I am, respectfully, your obedient servant,

F. P. CLUTE,
Commissioner of Labor and Inspector of Mines.

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INTRODUCTION.

In the absence of State statutes compelling operators of mines, manufactories, mills, railways, etc., to give necessary data, the compiling of accurate and complete statistics is almost an impossibility; besides, the limited appropriation for expenses and the inadequate assistance allowed the Commissioner, prevents the gathering of industrial statistics, except through the mail.

This Bureau has compiled a complete list of all industrial enterprises in the State, and to each concern or individual a blank has been mailed, requesting the necessary data to make up their statistics for the year 1895. What has been accomplished can be seen by the appended tables.

Entering upon the duties of this office May 15, 1895, no data of any importance was found for the work of the Bureau from January 1 to that date. There being no appropriation to cover the expenses of the Bureau until the adjournment of the Legislature, June 16, 1895, but little of importance was accomplished until after that date, or until the appropriation was secured.

My time has been fully occupied inspecting the mines and factories since above date.

The mines throughout the State have passed through a period of business depression that has tested the qualifications of their managers to keep them in operation, and the consequences are that several have been forced into receivers' hands. The result of the depression is clearly shown by the condition of many of the mines, the management having neglected all possible repairs and works of maintenance in order to reduce expenses, thereby endangering the lives of employes in various ways.

The laws of the State require the Inspector to visit each mine every three months. This requirement would compel the Inspector to inspect two mines each day, and allow him no time for traveling from mine to mine. The Inspector should have time to make his investigations thorough and complete, which would require several days at some of the mines, and until an assistant is allowed on this work, and some necessary legislation is had, the work of the Inspector will be handicapped to some extent.

The abolishment of a coroner's inquest over the victim of a fatal accident in a mine was surely an oversight on the part of the Legislature, and an act that adds largely to the duties of the Inspector of Mines, as it now rests with the operators or some interested "responsible citizens" to make the required affidavits to have a coroner's jury to investigate such an accident, provided the Inspector could secure an inquest in case of a fatal accident, if he should be in the vicinity and immediately notified and in a position to go to the scene at once. But fatal accidents occur of which the Inspector knows nothing for days, even weeks afterward; often he is absent in a distant part of the State inspecting mines or factories. The desirability of having a coroner's jury investigate such accidents is justly felt by the miners and many of the operators. The facts brought out at such an investigation are often not secured by the Inspector in his investigation.

The law in reference to the report to the Governor being completed by the first day of each year is an impossibility, if accurate statistics are to be gathered of the year's business operations, for the reason that operators are frequently several days (and often several weeks) in closing up the accounts of the year, which is necessary before they can give accurate information of the year's work. The Inspector should be allowed at least thirty days to gather and compile these statistics.

Many of the mine operators look upon the Inspector as a lawbreaker would look upon a police officer, concealing everything from him that is possible, and giving but little, if any, assistance toward showing the true conditions existing in and around the mines, frequently resulting in important evasions of the mining laws being overlooked. The mining laws were enacted for mutual protection to operators and miners, and in their crude condition, if properly and rigidly enforced, will result in a different feeling among the operators toward the Inspector, and do much to lessen the constant dangers attending the miners' hazardous occupation and the betterment of their physical condition. The miners should assist the Inspector in his work by calling his attention to defects and evasions of the mining laws. It is self-evident, where men are constantly employed in a mine, all defects are known to them, and in cases where they are not apparent to the Inspector, the miners, in justice to themselves and for their own protection, should be frank with the Inspector and inform him of the true conditions.

Many complaints against operators have been received, and in every case where a man had signed his name to the complaint, the matter has been investigated and his name reserved as a confidential affair. Anonymous complaints will not be considered in the future. Any person having a complaint against the operator must sign his true name to secure an immediate investigation.

Miners are entirely too indifferent to the dangers which surround them, for their carelessness alone is responsible for the majority of the accidents constantly occurring in every mining district in the world. Some of them seem oblivious to the dangers which threaten them constantly. This suicidal tendency cannot be checked until they become more cautious.

The recent calamity at Dayton, Tenn., is directly traced to the carelessness of one man, which resulted in the death of twenty-eight men and twelve mules, besides a loss to the Dayton Coal and Iron Company, Limited, of several thousand dollars. Several other accidents that have occurred in the State during the past year can be traced to the same source—a careless miner.

I have endeavored to improve the condition of the mines, and impress the operators and miners that the mining statutes must be carried out in every particular.

Some of the mines I have visited more frequently than others, but where these frequent visits were made, there were good and sufficient reasons for them.

Some few mines I have not inspected. They are mines that do not work regularly, but they will receive attention at an early date.

The convict lease system in Tennessee, so far as it pertains to mining, is a thing of the past; all convicts have been removed from

Tracy City and Coal Creek; their places will be filled by free miners. The long sought for event in the history of mining in this State occurred January 1, 1896, at the expiration of the lease to the Tennessee Coal, Iron and Railroad Company.

The State has opened a mine of its own, where a portion of its convicts will be maintained. There were 501 convicts at these mines December 31, 1895, but less than half of this number were employed in the mines; the balance were employed constructing the buildings and walls of the prison.

Some space has been devoted to the phosphate, petroleum and marble fields that will be of interest, especially as my next report will contain accurate statistics of these industries.

The value of the phosphate and petroleum discoveries to this State cannot be estimated. Some conservative uninterested men have estimated the available quantity of phosphate in the vicinity of Swan Creek Valley at one hundred million tons.

Efforts were made to procure the statistics of this work, but much to my regret, none could be obtained.

No complete statistics of the marble industry have been obtained, but a history of this industry is given, which will be followed in the future by statistics that will perpetuate the history of this very important resource.

I have endeavored to compile a complete list, accompanied by a brief history, of the various trade organizations of the State, but outside of Memphis and Nashville, my efforts have been unsuccessful.

I desire to acknowledge the valuable services rendered by my assistant, Hon. Albert E. Hill, of Davidson County.

IMPROVEMENT IN MINES.

I am pleased to report that a majority of the mine operators have taken up the work of improvement in their mines, that will result in great benefit to the health, comfort and safety of the men employed in them. Many other improvements are contemplated, and will probably be carried out this year.

I believe that a majority of the mines are now in better condition than at any time heretofore in the history of mining in this State.

A number of ventilating fans have been put in, and others contemplate the erection of fans. In every case the economy and beneficial effects of the use of fans for ventilating purposes have proven satisfactory.

A number of our mines would employ fans could they obtain suitable water conveniently for steam purposes.

I desire to have them investigate the use of gasoline gas engines for that purpose; for where they have been used their utility, simplicity and economy are fully demonstrated.

Our laws require "the splitting of air currents," and limit the number of men employed on each split; but few of our mines have adopted this system, for the reason that many do not understand its economy and simplicity, and that their mines were not opened properly. Wherever possible to carry out this plan, it has been my pleasure to recommend its adoption, and give all the necessary instructions for its adoption and operation.

The employment of compressed air or electricity, instead of steam, for operating mine pumps, should be a matter of legislative enactment.

It would conduce greatly to safety if the system of carrying the intake through two paralled drifts, of which one may be used as the "man-way" or traveling road, were introduced into workings likely to become extensive, and where mechanical haulage is intended to be employed.

COAL DUST IN MINES.

Many of our mines are dusty, and therefore the dangers arising from that source should be thoroughly understood by the miners and operators, since it has been demonstrated that dust is explosive in some instances and under certain conditions, in absence of any inflammable gases.

"The disastrous effect of fire-damp explosions in coal mines are almost always aggravated and extended by the existence of coal dust in dry mine workings and entries. A gas explosion in a dry mine, even if only of a comparatively trifling nature, will raise and inflame coal dust existing at the seat of the explosion or in the vicinity; the flame attending the explosion will be thereby increased and carried to more or less considerable distance, and may thus become communicated to any accumulations of explosive gas-mixture which may exist in gobs, rooms or other lurking places at a distance from the seat of the original gas explosion.

"The firing of an explosive in a shot-hole of a strength which is in excess of the power applied, or which has not been sufficiently tamped, will result in the almost complete projection of the highly heated products of explosion and of a more or less considerable body of flame from the mouth of the hole, as from the bore of a gun; it thus produces what is known as a blown-out shot. And further, if the charge of explosive is decidedly greater than that necessary to perform the desired work in the coal or stone where it is applied, a more or less considerable projection of highly heated products of explosion will also take place, and effects similar to those of a blown-out shot will be produced.

"The production of a blown-out powder-shot in a mine working, in the entire absence of coal-dust, or in a wet mine, is not attended by the projection of flame to a very considerable distance, but the flame thus projected is much increased in volume, if, as is frequently the practice, dry or slightly damp small coal has been used as stemming for the shot.

"If a blown-out powder-shot be produced in a dry locality where coal dust exists in more or less abundance, the flame, projected by the shot, is sure to be considerably increased and extended by the ignition of portions of the dust-cloud which is raised by the rush of air occasioned by the firing of the shot. A result of this nature will be produced, even if the air in the vicinity of the blown-out shot is entirely free from fire-damp.

"Unless the coal-dust which exists in the immediate vicinity of a blown-out powder-shot is dry, very finely-divided and of a very highly inflammable character, the propagation of flame from the shot by the raised dust will only take place to a comparatively limited extent, if the atmosphere in which the dust is raised be entirely free from fire-damp.

"It is, however, well established that even when the air is quite free from fire-damp, an exceptionally inflammable coal-dust, in a very finely-divided and dry condition, and existing in abundance in the immediate vicinity of a blown-out shot, may, when raised by the shot, be ignited so readily, and carry on the flame so rapidly, that it may produce explosive effects of a similar character to those caused by a gas explosion. The flame, as it rushes along, if fed by a freshly raised dust, may extend under these circumstances to very considerable distances, with the results resembling, in their disastrous nature, those of explosions originating with, and mainly due to, fire-damp.

"If a blown-out powder-shot occurs in a locality where the atmosphere contains a small proportion of fire-damp (even not above two parts in 100 of the air), the presence of dry, fine, and porous dust, even if it be only comparatively slightly inflammable, may give rise to the explosive propagation of flame to distant localities, where either accumulations of inflammable or explosive gas-mixture (as in gobs or old working places), or deposits of very inflammable dust, may take up the explosion and still further extend its disastrous effects.

"Wherever a coal is worked which contains inflammable gas, the atmosphere in the vicinity of the workings, however efficient the working arrangements, will at one time or other, and it may even be said generally, contain some small proportion of fire-damp.

"Mines have hitherto been considered free from fire-damp when the search for gas by means of a lamp flame has been unattended by the appearance of a cap upon the flame, or by an elongation of the flame. This test, however, fails to indicate the presence of fire-damp, if the atmosphere contains less than from 2 to 2.5 per cent. of its volume of marsh gas.

"Such a slight contamination of the atmosphere of fire-damp is not only sufficient to greatly enhance the dangers due to the existence of dust in any abundance in a dry mine-working, as already described, but is also sufficient actually to give rise to the production of an explosive mixture with dust raised in it by a blown-out shot.

"Small proportions of gas, such as are referred to, when existing in the atmosphere of a mine, can now be detected by more delicate gas-indicators than a lamp flame; but, while a knowledge is thus afforded of the presence of gas, it remains impracticable to prevent such slight contamination by fire-damp of the air of a mine near the working places.

"No means are at present known by which security can be attained against blown-out shots during blasting in hard coal or in stone, and the use of powder in coal is sometimes attended by the emission of flame, even when blown-out shots are not produced.

"It follows from the foregoing that the firing of powder-shots in a dry mine-working where dust exists in abundance must always be liable to be attended with disastrous results if the air in such a locality is contaminated by fire-damp, even to so small an extent as in the proportion of 2 volumes in 100 volumes of the air of the mine.

"The constant removal of accumulating dust from the workings in dry mines, to such an extent as to guard against the raising of any considerable quantity of dust where shots are fired, could scarcely be so thoroughly carried out, in any but very exceptional cases, as to constitute by itself an effectual precaution.

"The application of water to the laying of dust in roadways has been applied here and there with some amount of success, but the effective adoption of such a measure in or near the working places is in some instances attended with practical difficulties.

"Unless very copious watering be resorted to, it would be ineffectual in guarding against the dangers arising from the firing of powder-shots in dry and dusty workings where the air may contain some small proportion of fire-damp. The employment of hygroscopic or deliquescent salts in conjunction with water has not been found a trustworthy means of maintaining dust in a safely moist condition.

"The dangers which attend the firing of powder-shots in dry mine-workings where dust exists in abundance, and where the air may contain even only a small proportion of fire-damp, can therefore not, with our existing knowledge, be effectually guarded against, except by combining the removal of dust, as far as practicable, with very copious watering.

"The obvious inference to be drawn from the foregoing is that a due regard for the safety of those employed in mines, where the conditions above indicated prevail, precludes the use of powder, unless the precautions just specified are effectually applied.

"The results of extensive practical experiments, carried out by Members of Accident in Mines' Commissioners of the British government, and by others, have demonstrated that the abolition of the use of powder, where the conditions above indicated prevail, will not generally involve any formidable inconvenience, because the work which is accomplished by its employment in coal can now be performed with equal efficiency and at very little, if any, greater outlay, by one or other of the following available alternative means:

"a. In some coal seams the lime cartridge will perform work quite equal to that accomplished with powder, at no greater cost, and with absolute immunity from risk of explosions.

"b. Mechanical appliances exist which will do efficient work, not only in some kinds of coal, but also in some stone or shale over or underlying coal.

"c. The so-called 'high' or violent explosive agents, which are represented by dynamite or gelatine-dynamite and by gun-cotton or tontine, can now be applied, not only for working economically in stone or shale, but also for coal-getting, by using them in conjunction with water, according to one or other of the methods described in this report.

"The 'high' explosives may be used, as indicated in 'c', with security against the ignition of coal-dust, thickly suspended in air, by a blown-out shot or by the effects of an over-charged hole, even when the air contains some small proportion of fire-damp.

"One very simple method of using the "high" explosives in conjunction with water, included in "c", which may be supplemented by the use of ordinary tamping for securing the best working results, has, so far as several severe tests have shown, afforded a complete safeguard even against the ignition of an explosive mixture of fire-damp and air by a blown-out shot.

"Therefore, in dry mine-workings where the removal of dust, combined with copious watering, cannot be carried out, and where neither of the alternative methods, a and b, of working in coal can be advantageously substituted for blasting by means of powder, in localities where fire-damp is liable to have access to the mine workings, shot-firing may be safely carried on, provided that any one of the 'high' or violent explosives is employed, in one or other of the modes described, in substitution for powder.

"But the methods of operation which furnish effective safeguards when applied in conjunction with the high explosives, fail to furnish such safeguards when applied, in the same way, together with powder.

"Unless, therefore, effective measures be adopted for the removal of dust, as completely as practicable, in the vicinity of the place where the shot is to be fired, such removal being followed by copious watering, the employment of powder, or of any explosive preparation of a similar nature to powder, should be prohibited in dry coal mines where fire-damp may pervade the air, and where at the same time coal dust accumulations are unavoidable.

"With the view of promoting security from accidents under circumstances where blasting may be practiced in coal mines, we would recommend that the following instructions be observed:

"1. That all work involving blasting in mines should be entrusted only to experienced workmen.

"2. That, in order to lessen the risk from blown-out shots, particular care should be taken that each shot should be assisted by under-cutting and nicking or shearing whenever it is practicable.

"3. That the tamping, stemming or ramming should consist of very damp or non-inflammable material; in no case should dry coal dust be used for this purpose.

"4. That, where strong tamping is needed, the compression of air at bottom of hole should be avoided by pushing in the first part of tampings in small portions.

"5. That, where safety lamps are used and powder is employed, the shots should be fired only by special appointed shot-men, who before firing the shots shall satisfy themselves that the foregoing instructions are observed, and shall also satisfy themselves, by carefully examining all accessible contiguous places within a radius of twenty yards of the shots to be fired, that fire-damp does not exist to a dangerous extent.

"The employment of an ordinary miner's fuse, which, when burning, is liable to allow fire to escape from its extremity, or laterally into the atmosphere, should not be permitted in any mine workings where the exigencies of safety dictate the exclusion of powder and the substitution for it of one or other of the 'high' explosives in conjunction with water.

"Similarly, no description of mining fuse, however safe in itself, should be allowed to be ignited in such localities, by means either of a lamp-flame or of a wire which has been made red-hot by inserting it into the gauze of a safety lamp, or by means of any other source of fire which, when applied to the lighting of the fuse, must come into contact with the atmosphere of the mine.

"Electrical exploding appliances present very important advantages from the point of view of safety over any kind of fuse which has to be ignited by the application of flame to its exposed extremity, as the firing of shots by their means is not only accomplished out of contact with air, but is also under most complete control up to the moment of firing. Their simplicity and certainty of action have been much increased of late years, while their cost has been greatly reduced, and but little instruction is now needed to insure their efficient employment by persons of average intelligence.

"For the foregoing reasons the use of electrical arrangements for firing shots in mines, where the employment of powder for blasting is inadmissible, should be encouraged as much as possible.

"Where the regular use of electrical exploding appliances is attended with serious difficulties, as in wet mines, a special form of miner's fuse, now procurable at a cost very slight, if at all, greater than that of the ordinary miner's fuse, and exempt from the defect of a possible lateral escape of fire, should be employed, but it should be used only in conjunction with a special self-contained igniting arrangement. Such an appliance should be constructed to fit over the entire exposed end of the fuse in a shot-hole, and to ignite the fuse out of contact with air, and after the lapse of a definite interval (i. e., five minutes) from the time when it has been set into action by the person in charge of the shot-firing. Simple, cheap and efficient forms of 'igniter' have been devised which fulfill these conditions."

It is well known that the dangers from dust explosions are enhanced by heavy and strong air currents, consequently the airways should have a large cross section, that the legal amount of air may be supplied with a moderate speed of current.

FIRE DAMP ($C. H_4.$)

Several mines in this State generate (or liberate) a considerable quantity of fire-damp, and require great caution and frequent examinations to prevent any accumulations. These mines should be carefully examined by a competent fire-boss, before the men are allowed to enter their working places, for presence of gas. Definite and explicit rules should be established, and all work conducted in accordance. Only approved test lamps should be used for examination purposes, and the oil should be of purest possible character (seal or rape oil mixed with one-third of its bulk of highest proof coal oil is recommended), capable of giving a steady white light.

The only safeguard against danger from this gas is an abundance of fresh air, properly distributed and maintained through the works, to dilute and render the gas harmless. Legislation is needed to regulate the operation of gaseous mines.

LEAD MINES.

HARDWICK MINE, Bradley County.

Operated by Hardwick Lead Company, Cleveland, Tenn.

C. L. Hardwick, President and Manager, Cleveland, Tenn.

Mine inspected October 15, 1895.

This mine is located about five miles southwest of Cleveland, Bradley County, Tenn.

This fissure vein has been opened up for a depth of over 200 feet, the vein being about vertical, and from 4 to 20 feet thick. Combined with the lead is a small percentage of zinc ore; walls are limestone.

The mine is worked double shift, about six men to each shift.

The output to a shift is about 20 tons.

The hoist used is a large iron bucket. This should be replaced with a modern cage, with safety appliances, and some artificial means of ventilation adopted.

The ore is dumped in a pile; from there taken to a crusher and crushed; then, after passing through a modern concentrator, which separates the zinc ore from the lead, the latter is thoroughly dried and passed through a water jacket furnace. Capacity of furnace, 25,000 pounds per day.

The manner in which the workmen in mines were handling dynamite was extremely dangerous.

The shaft has the usual ladder, which required some repairs.

One fatal accident was reported from this mine, as follows: L. R. Smith, May 25, 1895; age 56; married; had worked in mine two weeks; former occupation that of a sailor; was killed by falling in shaft. Cal Giles was present. Wm. Gilbert and Jno. Worley were first to reach the scene of the accident.

CLEVELAND, TENN., May 28, 1895.

F. P. Clute, Commissioner of Labor, Nashville, Tenn.:

DEAR SIR—Mr. L. R. Smith was accidentally drowned at our mines on the 25th inst., and we would have reported sooner, but awaited verdict of coroner's jury, which fully vindicated us as to liability of said accident. They report that it was due solely to his carelessness. Will send coroner's report as soon as obtainable.

Truly yours; HARDWICK LEAD MINES.
By JULIUS HARDWICK.

STATE OF TENNESSEE,
BRADLEY COUNTY.

An inquest holden on May 25, 1895, at the Hardwick Lead Mines, in the Fifth Civil District of Bradley County, Tenn., upon the body of L. R. Smith, then and there lying dead. The jurors, whose names are hereto subscribed, on their oaths do say: That name of deceased was L. R. Smith; 56 years of age; that he came to his death on the 25th day of May, 1895, at about 4:50 o'clock p. m.; that he was killed from an unused ladder in the Hardwick Lead Mines, in the shaft some fifty feet to the water below, and was either drowned or killed in the falling, the fall being caused by his own carelessness, the Hardwick Lead Mine Company being in no wise responsible for the fall.

Witness our hands and seals, May 25, 1895.

T. N. SENTER,
J. W. CHEEK,
M. H. NEWTON,
J. A. PANKY,
JNO. R. SANDERS,
S. A. GUIN,
G. G. MCCULLY,
Jurors.
W. S. TIPTON,
Coroner.

Cal Giles, being sworn, testifies as follows:

The deceased, whose body here lies, is that of Mr. Smith; I have heard him say he was 56 years old; he was employed in the Hardwick Lead Mines as a day laborer; he told me he was married, and lived in Chattanooga; I worked with him this week and part of last; he and I were to-day getting a pipe down in the mines; he tied the pipe to one of the ladders; he was below me about 6 or 8 feet; I heard a noise and looked around and saw him falling; I saw him go down, but could not see to the water; it was probably 50 or 60 feet to the water from where he fell; he tied the pipe to the shaft ladder; I wanted to tie it to the angling ladder or man-way; I told him he was liable to step off the shaft ladder, as it had not been used in a long time; it was not in common use; he got on the shaft ladder and proceeded to tie the pipe; I had started to come out, and think he had also started to come out; after he tied the pipe he told me it was all right; no one was present but myself and the deceased; he was careless in his climbing; he said he had been a sailor; I spoke to him several times about climbing around so carelessly; I have seen him climb pipe in the shaft; when I saw him falling, his head was going backward and struck a pipe on the shaft; the fall was sufficient to cause his death; I don't know that he struck but one pipe, but I heard the pipes rattling as he went down; there were also two timbers and a pump that it was possible for him to strike; I have never known a pipe tied to the shaft ladder before, as it is old and not in use; he was holding to the ladder before he fell; he knew that ladder was not in use; when I advised him it was not safe, he replied, "Be-God, it's all right;" the shaft is about 6 feet in diameter; when I saw him falling his head was not quite on a level with his feet; when he struck the pipe with his head I examined but could not tell what he had been holding to; two rounds were out, but did not look like they were fresh broken; quite a number of rounds were out of the ladder at different places; the accident occurred about 4:50 p. m., May 25, 1895; I saw deceased next about 6:30 to 7 p. m., after he was brought up in the bucket; he was dead; me and John Worley and Wm. Gilbert went down after him at once, but he was not in sight, being under the water; we got his cap and lamp floating on the water; he could have easily tied it to the man-way, where I suggested to tie it; it would have been as secure tied to the man-way; in tying it to the man-way he would not have had to get on the old ladder; he and I climbed out the man-way a few days ago, so we would not have to use the old ladder; have not used the old ladder for a year, to my knowledge.

[Signed] CAL GILES.

John Worley, being duly sworn, testifies:

The deceased is Mr. Smith; I have worked in the shaft with him; I considered him reckless in climbing, and I have cautioned him about it; he helped me put a plank over the old shaft ladder road to prevent any one going on the ladder; I had cautioned Smith not to use the shaft ladder; the man-way is safe, and it is not necessary to get on the ladder.

[Signed] John Worley.

B. J. Ingram, being sworn, testifies:

I helped get Smith out of the shaft; we got him out of the water by taking a pipe and placing a hook in the end and fishing for him; the water was about 45 feet deep; we got his body near the top once, and it slipped loose and went back; the next time we got hold of him we got him out of the water; he was dead; we sent him up in the mine bucket used for hoisting ore.

[Signed] B. J. Ingram.

Henry Stinnett, being sworn, says:

I heard Joe Hardwick cautioning the deceased not to use the shaft ladder, and told him to keep off of it; Joe Hardwick is one of the Lead Mine Company, and acting as boss at that time; this was about ten days ago; Smith was careless in his climbing.

[Signed] H. H. Stinnett.

G. L. Hardwick, being sworn, testifies:

I am one of the company; I know the deceased; his name was L. R. Smith.

[Signed] Geo. L. Hardwick.

BLUE SPRINGS MINING COMPANY.

Samuel Divine, President, Chattanooga, Tenn.; C. E. James, Manager, Chattanooga, Tenn.

This mine adjoins the Hardwick mine, and is located on the same vein; it was not in operation.

Have no report of this year's operations from either company.

The two mines are connected for ventilation and to comply with the mining statutes requiring two openings 150 feet apart, or more.

I am informed that this vein can be traced for miles through Bradley and McMinn counties. If properly worked and managed, it may become a great industry in this State. I regret that I have no analysis of the ore.

COPPER MINES.

DUCKTOWN COPPER MINES, Ducktown, Polk County.

It was in 1849 or 1850 that copper ores were first discovered in the Ducktown district. Chalcopyrite impregnated in the quartz croppings of the Hiawassee ore-body in the bottom of a small creek southeast of and close to the present town of Ducktown misled the discoverer to believe he had found a gold mine.

The sinking of a shallow shaft on these croppings in 1850 led to the discovery of the rich zone of partly oxidized and concentrated copper ores—locally named "black copper"—which afterwards made Ducktown famous for its enormous deposits of rich copper ores.

Notwithstanding the intense mining excitement existing at that time, as a result of the California gold fever, the sparsely settled state of this district, together with its inaccessibility, delayed for more than a year the spread of the fame of the Ducktown copper region. But at the end of 1852, and down to the middle of 1853, the discoveries of enormous and enormously rich masses of copper ores engendered a regular mining furore. Any and every reddish or brownish coloring of rocks and every quartz-cropping in the region was made a mining venture, or, at least, of a mining company.

Old caved-in shaft-holes and drifts run in the hills (mostly, however, for short distances only), still testify to the prevailing speculative activity at that time.

The more important and enduring mines or mining companies of that period of the Ducktown mines came into existence in the following order :

Hiawassee	August, 1850.
Cochico	October, 1850.
Tennessee	October, 1851.
Polk County	November, 1852.
Cherokee	December, 1852.
Eureka	April, 1853.
East Tennessee	June, 1853.
Isabella	July, 1853.
London	September, 1853.
Mary	September, 1853.
Callaway	November, 1853.
Culchole	February, 1854.
United States	August, 1854.
Biggs-Boyd	August, 1854.

This list clearly indicates the middle of the year 1853 as the culmination of the early Ducktown mining excitement. This is easily accounted for by the recorded production of 808 tons of ore, averaging 28 per cent. of copper, by seven mines of the region, during the month of September, 1853. The recorded production of eight mines up to that date, since the discovery of copper, three years before, had reached 14,291 tons of rich copper ore ; i. e., that amount of copper ore had been shipped away from Ducktown, mostly to Swansea, Wales. The amount of ore shipped was then valued at over a million dollars.

At the end of 1853, or beginning of 1854, smelting works were erected at different places in the district. The remnants of some of these works still exist. The Burra Company, owning the Hiawassee and Cochico mines, has the best preserved of these old smelting works standing on their property to-day. It contained four blast-furnaces of the German Brillenofen type, with two tuyeres to each furnace at its back and an exterior crucible for the separation of matte and slag.

The Union Consolidated Company, which controlled the Cherokee, Mary, Callaway, Isabella and East Tennessee mines, and also at times the Polk County and Tennessee mines, erected the first smelting works on the Old Tennessee mine land, which belong to the school fund. Later on, smelting and refining works were erected on the land of the Isabella mine, where the village and postoffice are now located. These last-named works were kept running longest.

The Polk County Mining Company, owning the mine from which it derived its name, erected smelting and refining works of its own on its lands. These works closed down, when the company failed, after exhausting the richest part of the black ore zone of its mine. Subsequently, the property reverted to one of its original owners, after a protracted lawsuit.

Ducktown seems to have had its due share of the curse of every prosperous mining locality—lawsuits.

The Tennessee, or Old Tennessee mine, located on a section of land (No. 16), belonging to the school fund, was leased to a company by the school commissioners. It contributed a splendid yearly income to the public school fund. But some legal flaw of the lease executed by the school commissioners led to a lengthy lawsuit, and the stoppage of regular mining on the school property. All revenue accruing to the school fund from this source ceased. Then came in succession the robbing of the remaining black copper deposits in the mine by "tributers," without any benefit to the school fund, and an enormous claim for lawyers' fees against that section of land, standing against it to this day, making it valueless to the school fund itself. The value of the Tennessee mine was given during this celebrated lawsuit at from $200,000 to $1,000,000, based on its supposed possible output of copper ore. Such values put on lands around Ducktown in sober, good faith by reputable witnesses under oath, show better than anything else the exaggerated estimate then entertained of the inexhaustible resources of rich ores which the mines were supposed to contain.

But already in 1860, at the beginning of the war of the rebellion, the production of the rich black-copper ores had fallen off considerably. Experiments were in progress, under the energetic and competent management of Capt. J. E. Raht, to utilize the inexhaustible supply of low-grade sulphuret ores—the so-called "yellow" ores—of the district in the production of copper.

The civil war, of course, did not contribute to the prosperity of the mines. During the war, however, the Ducktown copper-production was a valuable and necessary industry to the Southern States. The copper produced by these mines was sorely needed for the manufacture of cartridges and other war material, and the mines, therefore, were not allowed to remain idle. At the close of the war most of the black-copper deposits had become exhausted, and the sulphuret ores, of which an inexhaustible supply seemed in sight, proved too low in copper to pay for extraction. Experiments in concentrating the more slaty and quartzy sulphuret ores were of as little avail on the whole, as experiments and leaching and precipitating the copper of the sulphuret ores, after a preliminary roasting. The fuel used at that time was wood for roasting, and charcoal for smelting in the small blast-furnaces, which were able only to treat a few tons of ore per day. The dense forest originally covering the whole region had disappeared completely for miles around Ducktown, and the wood for the charcoal manufacture had to be brought from a distance of ten to twenty miles. All supplies for the mines and works had to be hauled by teams forty miles, from Cleveland, Tenn., the nearest point on the East Tennessee, Virginia & Georgia Railroad. Under all these adverse circumstances, Capt. J. E. Raht managed to keep the mines going; but the company dispensed with his services, and instituted a monster lawsuit against the former manager, out of which Capt. Raht came with a complete vindication of his character and management.

The mines under new managers, unfamiliar with the details of the business, (which only the closest knowledge of all details, coupled with an extraordinary ability of management, could keep alive), very soon became overburdened with debt, and got into the hands of a receiver. Mr. E. Miller, one of Capt. Raht's former assistants, was appointed by the court to this office, and before closing down the mines and works succeeded in paying nearly all the indebtedness, by smelting the accumulated reserves of roasted ores. No new mining operations were allowed by the court, and in 1878 or 1879, when the last of the roast-piles had been put through the furnace, the smelting works closed down, and the first period of the Ducktown mines as copper-producers came to an end.

After this came a period of complete inactivity in mining, followed by starvation of the people remaining in the neighborhood, and the emigration of a large majority of a once large and thrifty population. Where in 1860 and 1870 probably four or five thousand people had found ample employment, in the years 1887 and 1888 probably less than five hundred tried very hard to eke out a scanty subsistence, hoping for better times from a revival of the once flourishing copper mines.

The revival of the mining industry of Ducktown came through the building of the Marietta & North Georgia Railroad, connecting the city of Knoxville, Tenn., with the town of Marietta, Ga., which is only 20 miles north of Atlanta. This railroad gave to the Ducktown mines easy access to the coal fields of Tennessee and Kentucky. Instead of charcoal at 10 cents a bushel (20 pounds), coke of a quality equal to Connelsville could be laid down at Ducktown at a little above $3 per ton. It was also much less expensive to get machinery and supplies to the mines, and the product of the mines and reduction-works to a market.

Metallurgical art has also advanced wonderfully during that decade of idleness at Ducktown. When the mines and works shut down in 1879, the ores had been smelted in small, old-fashioned blast-furnaces, built of brick and fire-proof stone brought from North Carolina. The area of those furnaces at the tuyere-level had been less than 4 square feet. The blast had been furnished through two tuyeres by an upright double-cylinder blowing engine, driven mostly by water power from overshot wheels. These furnaces smelted probably 4 to 5 tons of charge each in 24 hours. Each required nearly as many men to run it as one of the modern water-jacketed furnaces, taking 100 tons of smelting-charge per day, which have taken their places. These large furnaces not only materially decrease the labor-expense per ton of ore for smelting, but they also use much less repair than the old ones. In fact, during that decade metallurgy had caught the spirit of our modern times, and metallurgical operations were carried on upon a scale probably beyond any dreams of the metallurgists.

In mining also much progress had been made. Dynamite had taken the place of black powder; the power drill had to a large extent superseded hand-drilling; opening a mine for a large production had become the work of months, instead of years. By working mines on a large scale and treating large quantities of ores, it had become possible to take into serious consideration the working of mines containing ores of lower grade than could be worked profitably in the old small way.

Many metallurgists and mining engineers of good repute had visited and investigated the Ducktown ore deposits during the decade of their idleness. All of these investigators had found the ore too poor to pay if worked for copper alone; and as a sulphur ore the pyrrhotite of Ducktown was justly condemned by these experts. The fate of the district looked dark indeed.

In 1889, when the M. & N. Ga. R. R. had been finished, the formerly productive mines around Ducktown were owned by the following parties:

The Union Consolidated Company, or its successors, owned the East Tennessee, Isabella, Callaway, Mary and the Cherokee mines, besides much other land which might have had the name "mine" attached to it, but which contained neither known ore-bodies nor gossan-out crops.

The Burra-Burra Company, which has since been reorganized, owned the Hiawassee and Cochico mines, besides other land.

The Raht heirs owned the London, Eureka and Culchote mines, besides much timber and farming land in the neighborhood.

The Keith heirs owned the Polk County mine.

The Byrd Boyd mine was owned by successors to Boyd, the original owner.

The School Trustees had the power to lease, but not to sell, the Tennessee mine.

In 1889, an English company, the Ducktown Sulphur, Copper and Iron Company, bought the interests of the Union Consolidated Company, or its successors. They commenced operations in 1890 and spent considerable money in experimenting with a combined roasting, leaching and smelting process, intending, as reported, to save everything contained in the ore—sulphur, copper and iron. A Mr. Guilstrap conducted the operations for about a year; but the process employed was evidently not adapted to the ore. The company then put up smelting works with a modern Herreshoff furnace, capable of smelting over 100 tons of charge per day. They also put their Mary mine into suitable shape for the production of that amount of ore, and more. Since then mining and smelting operations have been carried on regularly and with apparent success by that company. It also reconstructed the old narrow-gauge railroad of the Union Consolidated Company, connecting the Isabella mine, where the smelting works are located, with the Mary mine, and has prolonged the track down the valley of Davis Mill Creek to a connection with the M. & N. Ga. R. R., at Isabella Junction. Moreover, a third rail has been laid all the way from Isabella Junction to the Mary mine on to the smelting works at Isabella, where quite a village, with a post-office, has been established, and on to the Isabella mine.

Prior to the late financial panic in 1893, and the consequent drop in the price of iron ore, another company, the London Iron and Coal Company, had secured a lease from the Ducktown S. C. & I. Co., on the gossan-out crop of the Isabella mine, and had mined and shipped a pure limonite-ore from that mine to iron furnaces in Tennessee and Kentucky. While somewhat high in silica and sulphur the iron ore is very low in phosphorus, and thus formed a welcome addition to the mixtures at Southern blast furnaces. This ore is being shipped in large quantities to blast furnaces at South Pittsburg, Tenn., and Middlesborough, Ky.

About two years ago the Ducktown S. C. & I. Co. increased the capacity of its works, which are now running regularly two large Herreshoff furnaces, turning out in one smelting operation a 50 per cent. matte from a roasted ore carrying probably not much above 3½ per cent. of copper. They treat about 200 tons of ore each twenty-four hours. A large roasting yard has been established between the Mary mine and the Isabella smelting works. Here the ores are roasted in open heaps, protected from the weather by rough shed-roofs.

The Burra Burra Comyany has done during late years considerable opening and prospecting work on the former Cochico, now generally known as the Burra-Burra mine. An adit about 500 feet long has been driven from the lowest available point on their property across the east or hanging wall of the ore deposit to the vein, and after the vein had been tapped at about the level of the former black copper zones, a level has been run south along the east wall for about 100 feet, gradually attaining greater depth below the old workings. But work has been suspended for some time by this company.

Some Pittsburg, Pa., parties, composing the Pittsburg and Tennessee Copper Company, obtained in 1891, from the School Fund Trustees, a long mining lease on the old Tennessee mine. After doing considerable prospecting work on the ore deposits of that mine to various depths, down to more than 200 feet below the outcrops, the company secured a long lease of the Polk County mine from the owners of that property. In the summer of 1893 it began the work of opening that mine for a large production. In the spring of 1894 the erection of reduction works was commenced after the plans of Carl Henrich, and the mine and works were connected by a narrow-gauge railroad with each other and with the Marietta and North Georgia Railroad, at the mouth of Potato Creek, at the new station of Ferguson, named after the President of the Pittsburg and Tennessee Copper Company.

DUCKTOWN SULPHUR, COPPER & IRON COMPANY, Isabella, Polk County.

Eives & Allen, Managing Agents, London, England.
Thos. Carter, Superintendent, Isabella, Tenn.
W. H. Case, Consulting Engineer, Charlotte, N. C.
W. Y. Westervelt, Mining Engineer, Isabella, Tenn.

Mines inspected October 22, 1895.

MARY MINE.—Shaft about 270 feet deep. The mine was worked by two shifts, employing about thirty men to each shift. Output about 280 tons of 4 per cent. copper ore each twenty-four hours.

Report of inspection to the Company:

NASHVILLE, TENN., Oct. 31, 1895.

Ducktown Sulphur, Copper and Iron Company, Isabella, Tenn.:

GENTLEMEN:—I have made an official inspection of the mines operated by your company near Isabella, Polk County, Tennessee, known as the Mary and Callaway mines, and I hereby call your attention to the following statutes of the State of Tennessee that are not complied with at your mines:

Acts of 1881, chapter 170, sections 1 and 2, provide for an accurate map of all mines in the State to be filed in this office, and in accordance with that act you must file map in this office on or before January 1, 1896, showing all details of the mines, property lines, etc.

Section 6, same act and chapter, requires the erection of a suitable wash-house for employes.

Section 7, same act and chapter, requires that all mines shall be ventilated by a furnace, or some suitable mechanical appliance, showing that natural ventilation is not legal.

Section 10 provides what constitutes a legal signalling apparatus, and I must insist on a strict adherence to this section, as well as all other sections of the mining laws. Also, provides for improved safety catches on all cages, and that the cages shall be covered overhead.

Section 13 provides for the inspection of all boilers in or around mines; and I am informed that you carry boiler insurance, so you can have certificates sent to this office from the insurance company inspectors, which will be satisfactory to myself.

Special attention is called to the Acts of 1887, chapter 247, showing that the act above referred to covers all mines in this State.

Safety gates at all landings in the mines, and at top of shaft, should be used; the gates should be arranged to work automatically by the cage, and be of sufficient strength to prevent a car from being pushed through them into the shaft.

I called Mr. Westervelt's attention to several dangerous places in each mine, and trust they will have immediate attention.

I enclose copy of the acts referred to, and hope to find your mines in a legal condition at my next inspection.

Yours very truly,
F. P. CLUTE, *Commissioner.*

Nov. 27th, 1895, I made another visit to these mines, and found the improvements were being made.

The company is shipping about 300 tons of iron ore daily to Middlesborough, Ky., and South Pittsburg, Tenn., furnaces.

The following is the analysis of the "Gossan" iron ore:

Metallic iron	54.85
Phosphorus	0.056
Sulphur	0.35
Silica	4.68
Copper	0.25

Analysis made at South Pittsburg, Tenn.

No report of the output of the mines.

This company operates the Callaway Copper Mine. It is contracted to R. A. Bell.

Map of mine has been filed.

April 13, 1895, Wm. Carter, aged 26, married and leaving three children, was killed by falling in front of a moving train.

May 15, 1895, Clifton Baxter, a machine miner, aged 28 years, was killed by the explosion of a piece of dynamite he was picking out with a pick. His helper, Andrew Caldwell, was badly injured about eyes and head at same time. David Hawkins was first to reach scene of accident.

THE PITTSBURG AND TENNESSEE COPPER COMPANY, Ducktown, Polk County.

Isaac Reese, President, 3,222 Penn avenue, Pittsburg, Pa.
H. Ferguson, Vice-president, 3,222 Penn avenue, Pittsburg, Pa.
A. H. Leslie, Secretary and General Manager, Pittsburg, Pa.
Ricketts & Bush, Consulting Engineers, 104, John St., New York.
D. J. Nelson, Superintendent, Ducktown, Tenn.

Mine inspected October 21 and November 26, 1895.

Depth of shaft, 210 feet; output, 110 tons each 24 hours; 50 men employed inside the mines.

Report of inspection to the company:

NASHVILLE, TENN, Nov. 1, 1895.

Pittsburg & Tennessee Copper Company, Ducktown, Tenn.:

GENTLEMEN—I have made an official inspection of the mines operated by you near Ducktown, Polk County, Tenn., and hereby call your attention to such parts of the mining laws as are not complied with at your mine, known as the "Polk County Mine."

Acts of 1881, chapter 170, sections 1 and 2, provide that an accurate map of all mines in the State be filed in this office. This will give you until January 1, 1896, to file your map.

Section 6, same act and chapter, requires the erection of a washhouse for employes.

Section 7, same act and chapter, requires that all mines must be ventilated by artificial means, either by a furnace or some suitable mechanical appliance, showing that natural ventilation is not legal.

Section 10, same act and chapter, sets forth what constitutes a legal signaling apparatus; also, a legal cage and appliances.

Section 13, same act and chapter, provides for the inspection of all boilers used around the mines, and the filing of inspectors' certificates in this office.

Acts of 1887, chapter 247, section 11, show that the above acts cover all mines in this State.

Acts of 1893, chapter 159, sections 1, 2, 3 and 4, forbid the employment of children under 12 years of age in or around the mines.

I herewith enclose copies of the laws referred to, and trust they will be strictly adhered to in the future.

The dangerous manner the men handle dynamite in your mine should be stopped. In no case should the caps be kept near the dynamite.

Yours very truly, F. P. CLUTE, *Commissioner*.

The dynamite was taken in the mine by the box and scattered in various places, frequently with the caps lying on top of dynamite. I ordered a magazine built in the mines, where this material could be kept in a safe manner. This mine has a small furnace, but it is seldom used.

The cage has the Ledgerwood safety catch applied.

Map of mine has been filed in this office.

No report of operations.

The company operates two smelting furnaces, making a 50 per cent. copper matte, which is shipped to refineries in other States.

May 26, 1895, a fatal accident happened in this mine. Chas. Ferguson, a miner, was killed, leaving two orphan children. The accident is fully described in the following depositions:

George Guy, after being duly sworn, deposes and says:

Q. Did you work last night?

A. Yes.

Q. Where do you live?

A. I live in Georgia.

Q. Yes, but where do you stay?

A. I stay right down here in Polk County.

Q. Do you know Charlie Ferguson—did you know him last night?

A. Yes.

Well, Mr. Guy, just go ahead and tell the jury what you know about this case.

I was working in the mine last night; they rung for the cage to come down, and I went down with it, and me and Bob got on the cage with him to come up; he was standing on the southeast corner (or near the corner) of the cage—the opposite side to me; I was standing on the northwest corner, facing the wall of the north side of the shaft, or a little to the left, and Bob was standing on the same side of the cage I was, but at the other corner to my right; I was standing there at the line, and saw him falling and grabbed the line and rung him to stop the cage, and it stopped.

Q. Did he kill himself by falling?

A. I think not; he was lying with his feet toward me, and his head almost in the opposite direction, only he was bent a little to the front; he was very close to the timber when he fell, and when the cage came up it caught his head between it and the timber.

Q. Did the engineer stop the cage as soon as you gave him the signal, or how about that?

A. I could tell that he made a little stop just as I gave him the signal to stop.

Q. How far is it from the edge of the cage to the timbering?

A. I suppose it is; I looked at it; it looked like it was about an inch and a half to the timber; the timber is put in in sets, and he was in one of the sets; he was fast between the cage and the timber when the cage stopped, and I rung them down to get him out; it had a very narrow space to pass the timbers, and coming up to them there is very little space; there is no more than an inch and a half space.

Q. What time was it when the accident occurred?

A. It was along about 3 o'clock.

Q. What brought you out—was he sick?

A. No; he said he was coming out to do his business.

Q. Had he been complaining about being smoke-sick?

A. He had not been complaining about the dynamite smoke to me.

Q. Was he dead when the cage stopped?

A. I could not tell whether he was dead when it stopped or not.

Q. Did the cage jar or jerk to make him fall?

A. No.

Q. Who is the engineer—is he a good, careful man?

A. Dad Barnes (Joe Barnes hereinafter) is engineer; he is a good, careful man.

[Signed] GEO. GUY.

Sock Pool, after being duly sworn, deposes and says:

Q. Where do you work?

A. I work in No. 1 and No. 2 stope-both.

Q. Were you working there when the accident occurred?

A. Yes, I was working there with Jim Moore, Will Amburn and Bob Andrew, when he got caught in the cage.

Q. Do you know what he went out for? Did he say he was sick?

A. No, he just said he was going out.

Just go ahead and tell the jury what you know about the accident.

A. Well, he got on the cage, him and Bob Andrew, and directly they come back down with him, and let Mr. Blevins know it.

Q. Where was he working?

A. He was working in our stope.

Q. Did you hear him complain of being sick?

A. He said he had a headache when he was working in the stope.

Q. Do you know anything about how he come to get killed?

A. No.

Q. Was he dead when they brought him back down?

A. I did not see him to look at him until they brought him out to the top.

Q. Was he dead when you saw him?

A. He looked to be dead then, but I could not tell exactly.

Q. Do you consider the shaft and cage road safe?

A. I am no judge of a shaft.

Q. Is the engineer a careful man?

A. I guess the engineer is a good one.

Q. Is the machinery in good shape? Does the cage work well?

A. The cage works well so far as I know; it has never worked any other way when I was on it.

Q. Was there anything put on the cage when the men came up —any drills or steel?

A. I don't know that there was anything put on the cage when he got on; I don't remember that there was.

[Signed] S. L. Pool.

James Moore, after being duly sworn, deposes and says:

Q. Where do you work?

A. I work at "Polk County."

Q. Did you work last night?

A. Yes.

Q. Who works with you?

A. I work with Bill Amburn—my partner.

Q. Mr. Moore, just tell the jury what you know about the accident—how it occurred.

A. I worked where this man did—in the same stope where he worked last night—and we had a right smart of shooting to do in the upper stope, and a right smart in the same stope. The winze was choked up, and the current of air made the smoke lie on us, and we had to get out of it in a few minutes.

Q. What time did this accident occur?

A. Between two and three o'clock in the morning. Mr. Blevins had some loose stone he wanted to break up so as to make light work, and I had gone out to get some fuse and powder to knock down some balk ground in the stope.

Q. Did you hear him say he was sick?

A. He said he was feeling a little dizzy. He said, "I have got the headache pretty bad; feel pretty tough." Him and Mr. Blevins went on to the shaft and connected up to the battery and put off their shot, and we waited for the smoke to clear away a little, and I told Amburn let's go back and get off our shot; we ran back in there, and, as I started from the shaft, this man Ferguson got on to the cage, and said he was going to the top for some purpose.

Q. Who got on the cage with him?

A. Geo. Guy, the cager, and Bob Andrew; but the cage had not moved when I went away from the shaft. I plastered my dynamite up, and about the time it began to take fire Bob runs back and hollows, "Ferguson is hurt"; but it had took fire. When we got to the top they had Mr. Ferguson laid out, and Mr. Blevins was holding his head up.

Q. Was he dead when you saw him?

A. Well, I took him by the arm and his pulse were beating slow, and then some of the boys went for the doctor. I put my hand on his breast, and I could feel his heart, and it took a little flutter and he was dead; but I guess he was dead when they got him loose from the timber.

Q. Is the cage all right?

A. Yes, the cage is all right, but of course a man in his fix is apt to get destroyed.

Q. Was anything put on the cage with them?

A. There was nothing sent up on the cage with the men—just three men. The same thing might have occurred with any man in the smoke.

Q. Was it the dynamite that made him sick?

A. I do not know whether it was the dynamite that did it or not, but last night was a bad night—it was damp, and the air was heavy.

Q. Did the smoke make you sick?

A. No. Some days I can stand as much smoke again as others, and the next day I might not stand half of that smoke. He said he was kind of drunk-staggery.

Q. Do you know what he came out for? Did he say it was on account of the smoke?

A. He did not come out on account of the smoke hurting him; a few hours before when he came up he complained of headache; we had not worked more than two or three hours before they had to shoot below; the winze was kinder choked up.

Q. Do you say the winze was choked up?

A. Yes, it was kinder choked up, but still it was open enough to let the smoke come through; it was a damp, heavy night, and I was feeling just like he said he was.

Q. Do you have orders to stay out of the smoke?

A. It is not our orders to stay out of the smoke until it clears away.

Q. Do they compel you to go into the smoke?

A. They do not compel us to go back into the smoke immediately after shooting; Ferguson was with Bob when they went back to do their shooting, and the smoke was a heap worse on us when we went back to do our shooting than it was on them.

Q. Do you have orders to stay out of the smoke, or do they compel you to go back to your work as soon as you are through shooting?

A. Away back over twelve months ago we were pressed pretty close about going into the smoke, but Mr. Henrich said he would discharge a man if he went back into the smoke before it cleared away.

Q. But haven't you got orders to stay out of the smoke until it clears away?

A. We use our own judgment sometimes, and there is nothing said about it, and I guess that is all right.

Q. Is there anything wrong with the machinery or cage?

A. There is no defect in the cage; I go up and down on it often.

Q. Do you always feel safe on it?

A. I have always felt safe on it, night or day, and there is a good careful engineer.

Q. How far is it from the edge of the cage to the timber?

A. About three inches.

Q. Do you think the shaft and cage road safe?

A. I consider the cage road as safe as any mine around here, except the lining; I would consider it perfectly safe if it was cased up.

Q. Is it the custom in the mines to case up a shaft?

A. No; but we used to have them cased up altogether.

Q. When you look down, going into this mine, do you feel safe?

A. Yes; when I go in the mine I feel perfectly safe.

[Signed] JAS. MOORE.

W. R. Blevins, after being duly sworn, deposes and says:

Q. Mr. Blevins, how long have you been here?

A. I have been here over a year since the 4th of January.

Q. Have you been working here all the time?

A. I have worked here ever since that time except five months during the vacation.

Q. What is your occupation?

A. Foreman of the mines—night foreman.

Q. Were you working last night?

A. Yes.

Q. What did you know about this accident?

A. Nothing, until it was over with; we had been shooting in the second level, about forty feet down from where these men were working; the winze was choked up with ore; I had some shooting to do in his place—there were three very large rocks to shoot with "daubys," as they are called—and we loaded the shots and he and

I coupled up the wire and went back to the shaft, and he pulled the battery, and we sat down to let the smoke get away, and then I left him and went back to No. 1 stope; in about ten minutes they came and told me that he was hurt.

Q. Was he dead when you got to him?

A. No; when I got to him his heart was beating; I unloosed his shirt and found that his neck was broken.

Q. Is the shaft safe?

A. The shaft I consider perfectly safe; I have been in mines for the last sixteen years, and this shaft is as safe as any I ever worked in; I have mined all over the West and Southeast, and this shaft is as safe as it could possibly be made.

Q. How was the smoke last night?

A. I was in the smoke last night a great deal more than he was, of course, and was in it through this shooting.

Q. Did the smoke affect you—bother you any?

A. No, sir.

Q. Did you hear him complaining about being sick?

A. I did not know that there was anything the matter with him.

Q. Did the smoke have any effect on you?

A. I did not feel anything wrong in any shape or form.

Q. Were you talking to him? did he say anything about being sick?

A. Well, the concussion blew our lamps out, and he just made some remarks about our lamps going out, and I left him at that time and went to the other place.

Q. How was the smoke last night—in the place where he was?

A. Such a night as last night was, rainy, the air damp and heavy, it was a great deal worse than it is a cool day; we only did what work we had to do in that entry.

Q. Do you compel the men to go back into the smoke before it is out?

A. I do not press the men to go back until the smoke is out—there is no compulsion.

Q. How is the air usually in the mine; do you get any draught?

A. The mine is well ventilated.

Q. Do you think this accident is the company's fault?

A. I do not.

Q. Does the smoke ever have any effect on you?

A. Yes.

Q. Does it affect all men alike?

A. No; it affects men in different places—in the head and stomach, but it affects me in the knees; I was once entirely down.

Q. Does the condition of a man's system have anything to do with the effect it has on him?

A. It depends a great deal on the condition of the stomach; when a man is in good health it does not have much effect on him.

Q. Did he say he was sick last night?

A. I did not hear a word out of him about being sick—no complaining.

Q. Do you think it was smoke that caused him to fall?

A. I do not know whether it was smoke or not.

Q. Could a man fall off the cage the way it is fixed?

A. He could not fall off if he were to try.

Q. What would be your supposition as to what caused him to get killed?

A. My supposition would be that he just completely gave way; I did not know that there was anything the matter with him.

Q. Is the cage in good shape? Have they got a careful engineer?

A. They keep a good careful engineer, and the cage is in good shape, could not be better.

Q. What do you do for men when they get sick from smoke in the mine?

A. If Mr. Ferguson had complained to me of the smoke, we always send good careful men with them to the top.

Q. Is that your orders?

A. That has been our custom—that is our orders, to be careful with the men in the smoke.

Q. Did you hear him complain any time during the night?

A. No, I did not hear him complain any time before this; he was talking when we were loading the holes, and asked me if I was going to church to-day; he said he wished I would go and hear that man preach.

Q. Did you know they were going out of the shaft?

A. No; I left them at the shaft out of the smoke; some men want to get to pure air when they are affected by the smoke, and some don't.

Q. Have you ever seen him affected by the smoke?

A. He has never been knocked out by smoke on my shift; he could stand as much of it as any man.

Q. When a man's stomach is out of order, is he easier affected by the smoke?

A. Yes; when a man's stomach is out of order the smoke has a greater effect on him.

[Signed] W. R. Blevins.

R. L. Andrew, after being duly sworn, deposes and says:

Q. Where do you live, Mr. Andrew?

A. I live in Florida.

Q. Where do you work?

A. I work over here at Polk County Mines.

Q. Did you work last night?

A. Yes.

You go ahead and tell the jury what you know about this accident, in your own language.

A. He got to complaining about the smoke, and we came out to the shaft and stayed till he got well, and he took a notion to go to the top.

Q. Who went with you to the top?

A. I and him and George Guy; and about the time we got in four bents of the top, he just gave way all at once and dropped; his head was caught between the cage and timber, and Mr. Guy stopped the cage and rung him down, and I pulled him back on the cage from where he was caught in the timber, and went back to the first level, and then went up to the top; he had been complaining a little of the smoke before we went out; the smoke was a little strong last night.

Q. How is the cage road—is it safe?

A. I consider everything safe when I go up and down.

Q. Did he tell you what he was going out for?

A. No, he did not tell me what he was going out for; he just said he was going to the top.

Q. Did he say he was sick?

A. He said he was feeling pretty bad on account of the smoke, and was going to the top.

Q. What do you think he was going out for?

A. It seemed that he was going up on account of the smoke.

Q. Did he ask you to go out with him?

A. No.

Q. Did the cage jerk as you were going up?

A. No.

Q. Was there anything on the cage to knock him off?

A. No.

Q. Were you talking with him as you went up?

A. No; but I was facing him; I could have talked with him; he did not say anything before he fell.

Q. You say you staid at the shaft awhile before you started up?

A. Yes; we sat at the first level for some time before we started up.

Q. What do you think was the matter with him?

A. He just seemed to faint and fall down.

Q. Do you consider these mines safe?

A. I am not a regular miner.

Q. What other mines have you worked in?

A. I never worked anywhere only here.

Q. Do you always feel safe in going up and down in this mine?

A. Yes, night or day.

Q. Did you try to catch him when he started to fall?

A. Yes, I made an effort to catch him.

Q. How far did the cage go after he started to fall?

A. It did not go more than eighteen inches after he started to fall until the cage caught him.

Q. Do they keep a man on the cage to attend to it?

A. Yes; one man goes up and down on the cage to ring for them to stop and start.

Q. What kind of an engineer have they got?

A. He is a good, careful engineer.

[Signed] R. L. ANDREW.

Joe Barnes, after being duly sworn, deposes and says:

Q. Where do you work?

A. I work at the engine in "Polk County."

Q. Did you work last night?

A. Yes.

Mr. Barnes, just tell the jury what you know about the accident.

A. I was running the engine when the accident occurred; Mr. Guy gave me the proper signal to pull by, and I started the engine; then I felt a jar, and I stopped the engine, and about that time I heard the signal to stop, and they rung the cage down to what we call the first drift.

Q. How is the machinery?

A. My engine is in good shape, and the cage is in good shape so far as I know; I was down one night this week, to start the pump, I think, and everything worked well.

Q. How soon did you stop the engine when you felt the jar?

A. Just as soon as I could.

Q. What was the signal he gave you?

A. I had three signals to pull men.

Q. How soon can you stop the engine when you get a signal to stop?

A. I can stop it very quick; I stopped the engine before I heard the signal, as soon as I felt the jar and heard the jerk.

Q. How soon afterward did you get the signal to stop?

A. It was just then that I got the signal to stop; I guess it was as quick as he could give it.

[Signed] J. F. BARNES.

STATE OF TENNESSEE,
POLK COUNTY.

An inquisition held at "Polk County Mines," in the county and State aforesaid, on the 26th day of May, 1895, before W. S. Maughan, Justice of the Peace for said county (the coroner of said county being absent), upon the dead body of Charlie Ferguson, there lying dead, by the jurors whose names are hereto subscribed, who, upon their oath, do say:

VERDICT.

He came to his death by accidentally falling on the cage, and being caught between it and the timbering of the shaft, which broke his neck, thereby causing death.

[Signed]

H. T. McKAY,
A. W. ANDERSON,
J. R. ELROD,
T. J. EPPERSON,
CHAS. AMBURN,
W. L. HAWKINS,
ISAAC ROBINSON.

Approved:
W. S. MAUGHAN, Justice of the Peace.

June 21, W. C. Stanley, a laborer, was badly injured at this mine. He pushed a loaded car into the shaft, and fell with it to the bottom, fracturing one leg and bruising himself badly.

ETNA COAL COMPANY, Whitesides, Marion County.

D. B. Pillsbury, Trustee, Whitesides, Tenn.
D. B. Pillsbury, Superintendent, Whitesides, Tenn.
J. P. Murphy, Mine Boss, Whitesides, Tenn.

This mine was inspected October 25, 1895.

Report of inspection to Trustee:

NASHVILLE, TENN., Nov. 1, 1895.

D. B. Pillsbury, Trustee Etna Coal Company, Whitesides, Tenn.:

DEAR SIR—I made my first official inspection of the mines operated by you, as Trustee, at Whitesides, Marion County, Tenn., known as the Etna Mines, Oct. 25, 1895, and herewith call your attention to parts of the mining laws of this State that you have not complied with at your mines, which must be observed in the future.

The Acts of 1881, chapter 170, sections 1 and 2, require that an accurate map shall be filed in this office of every mine in the State, the scale of which shall not be less than 100 feet per inch, and the map must show all details of the underground workings, all land lines, etc. This map must be completed on or before Jan. 1, 1896.

Section 6, same act and chapter, provides for a wash-house for employes.

Section 8, same act and chapter, makes it the duty of the mine boss to report the measurements to this office each month.

I enclose herewith blanks for that purpose, and shall insist on a strict compliance with this section.

Section 13, same act and chapter, provides for the inspection of all boilers used in or around mines, and the filing of the certificates of inspection to this office.

The condition of the doors in your mines must be improved at once; make all necessary repairs to them, and have all air-leaks properly daubed. The ventilation currents must be conducted to faces of all working places, and be maintained there. All the brattices require daubing and other repairs, to make them air-tight. I shall expect to find your mine in better condition at my next inspection, which may be at an early date.

I enclose a copy of the acts referred to in this. I also enclose several copies of chapter 159, Acts of 1893, which must be strictly observed.

Very truly yours,
F. P. CLUTE,
Commissioner of Labor and Inspector of Mines.

Inlet at ditch entry had 6,804 cubic feet of air per minute entering at that place; main entry had 4,864 cubic feet of air per minute entering mine, and at a water way there were 3,000 cubic feet entering, making a total inlet current of 14,668 cubic feet per minute; the outlet measured 14,715 cubic feet per minute at furnace. The air was not properly conducted to working places.

The mine is worked on a different plan to that of any other mine in the State; it is laid off in squares about 300 feet on a side, without air courses, except along the main entry. This requires the miner to drive the length of one of the sides without any air current.

Seam will average about thirty inches thick, and lies in a basin, the center being the lowest point in the field.

The number of men employed inside, about 160, and 16 mules.

Map of mines on file in office.

No report of ventilating measurements are made.

MINGO COAL & COKE COMPANY, Hartranft, Claiborne County.

C. M. Woodbury, President, Middlesborough, Ky.
P. L. McKendrick, Treasurer and Sec'y, Middlesborough, Ky.
R. L. Raulston, Superintendent, Middlesborough, Ky.
H. F. Welsh, Mining Engineer, Middlesborough, Ky.

No. 1 mine, H. M. Raulston, Mine Boss.

This mine was inspected July 16 and 17, and Dec. 3, 1895.

Report of inspection:

NASHVILLE, TENN., July 26, 1895.

Mingo Coal & Coke Company, Middlesborough, Ky.:

GENTLEMEN—I desire to request a change in the manner of ventilating your rooms in the Mingo mines, by a system of "break-throughs" between all rooms over 100 feet in depth that will secure some circulation of air through the rooms.

I would suggest that first "break-through" be made 90 feet from entry, and the second 180 feet from entry; the first one to be closed when second is finished. All "gob" to be deposited so as not to interrupt the currents through the rooms. I also demand that no entry be driven 90 feet ahead of parallel air-course or beyond a break-through.

Please clean up roadways that miners travel to and from their work, and drain all water from such entries.

Please send to this office a map of your mines, showing all entries, air-courses, rooms, direction of air-currents, etc., together with names or numbers of entries, rooms, and showing your drainage system, up to July 1, 1895.

Herewith I hand you blanks for air measurements, as required by Acts of 1881, chapter 170, section 8.

I hope to make a more thorough examination of your mines before January 1, 1896.

Very respectfully,

F. P. CLUTE,

Commissioner.

At the time of inspection there were about 37 men and 6 mules employed in the mines.

The break-throughs were from 100 to 200 feet apart.

Brattices and doors in fair condition. The rooms are about 250 feet deep, and but few were connected by "break-throughs." Air was bad in some of the rooms.

The oil burned by miners was evidently of a very poor grade, or had been adulterated by users.

Inlet showed 7,400 cubic feet of air entering the mine. The amount passing through furnace was considerable more, showing that other inlets existed.

Part of works was not properly supplied with air.

Many of the miners were not propping their rooms properly.

The seam is about 5 feet 10 inches thick, including a slate parting about the center of the vein 8 or 10 inches thick.

The seam is known as the "Raulston," or "Mingo." It is about 1,700 feet above sea level.

Ventilation is produced by furnace.

One accident has been reported by the company, but did not report the date of accident.

W. D. Vandeventer was injured by a fall of slate in face of his room; fell on his ankle and broke the small bone in the ankle.

No reports on ventilation.

No. 2 mine, A. Davis, Mine Boss.

Above inspection report covers this mine.

The furnace and shaft at this mine are not properly constructed. At time of inspection there were 30 men and 4 mules employed inside.

Air current at inlet measured 2,970 cubic feet per minute.

Analysis of Mingo coke:

Carbon	90.00
Sulphur	.90
Moisture	.80
Ash	8.83

The company has erected a novel washer for this section, and their superintendent is very sanguine of it doing the work expected of it. It is an "Anthracite Jig Washer"; very simple and easily operated, and of moderate cost. At time of last inspection it was frozen up, so I had no opportunity to see it in operation. It is their intention to erect others if their expectations are fulfilled.

Maps of mines are on file at this office.

STANDARD COAL AND COKE COMPANY, Newcomb, Campbell County.

STANDARD MINES.

Russell A. Clapp, President, Knoxville, Tenn.
Russell A. Clapp, General Manager, Knoxville, Tenn.
John C. Brooks, Superintendent, Newcomb, Tenn.
A. J. Artist, Mine Boss, Newcomb, Tenn.

Mines inspected September 12 and 13, 1895.

Report of inspection to Superintendent:

NEWCOMB, TENN., September 13, 1895.

J. C. Brooks, Superintendent Standard Coal and Coke Company, Newcomb, Tenn.:

DEAR SIR—Having completed my first inspection of the mines operated by the Standard Coal and Coke Company, under your management, I desire to call your especial attention to Chapter 170, Acts 1881, sections 1 and 2.

I will return the map on file in my office and request you to have it corrected to date and show thereon all works, rooms, entries, air courses, doors, brattices, air currents, shafts, etc., and return same to my office at your earliest convenience.

Section 6, same chapter and act, must be carried out if your employes demand it; otherwise I will not insist on it, for your men reside so near your mine.

Section 7, same chapter and act, must be carried out in every particular; that is, there must be 66 cubic feet of air per minute entering mine for every employe therein, and 396 cubic feet per minute for every mule working therein. This air must be conducted to every working place in the mine, or sufficient for the number employed in each place, according to act referred to above.

You must keep a man at furnace to keep it properly fired, and use every effort to carry out the law in this respect.

All doors and brattices must be kept in first-class condition, and have your mine boss stop all leaks each week.

Section 13, same chapter and act, covers your locomotive, and must be complied with.

You should have all entries and rooms watched for loose slate and fire clay, and whenever found should be taken down at once.

I leave blanks for air measurements, which I insist on having made and reported to my office, according to law.

Will supply you with blanks at any time you are out, by application to office.

I desire to call your attention to the Child Labor Act, a copy of which I herewith hand you. Yours very truly,

F. P. Clute,
Com. of Labor and Ins. of Mines.

At time of inspection there were 128 employes inside and six (6) mules, equivalent to 164 men. The ventilation was of legal capacity, but not properly conducted to part of the works; however, an air course was being driven that was intended to remedy that defect.

No indications of gas. Furnace ventilation. Furnace, shaft and stack in fair condition.

September 10, 1895, Elias Weaver (col.), 35 years old, single, a miner who had worked in the mines several years, was instantly killed by fall of slate.

Lee Ball, a driver, made the following statement to the Commissioner while investigating the cause of the accident:

"Was driving in mine for Standard Coal and Coke Company on September 10, 1895, on Italian entry, when coming out with trip Elias Weaver got on my trip, saying he was going out to see the mine boss to get another place to work; he said he did not like the place he was working in; after going about 100 feet a piece of fire clay (or slate) fell and caught him on head, killing him.

"LEE BALL."

The roof is a hard fire clay for thickness of five or six feet above the coal, and tends to disintegrate as it comes in contact with the air; the material being very heavy it frequently breaks out in large blocks by its own weight, without much warning.

The custom of miners riding on loaded cars is one that should be stopped by legislation, and all mine managers should post notices forbidding it.

Jno. C. Brooks, Supt., said "it was strictly against orders for any man to ride on loaded cars, and have repeatedly notified them, and have gone so far as to instruct the drivers not to pull cars with a man riding on them; have also posted circulars repeatedly notifying men not to ride on cars."

The company is timbering some of the entries. All employes are fully acquainted with the dangers of this top, when the strata of slate immediately above the coal is broken. The driver should have obeyed the Superintendent's orders and refused to allow Weaver to ride out.

Analysis of coal:

Fixed carbon	64.00
Volatile matter	33.00
Moisture	1.00
Red ash	2.00

Analysis made by J. W. Slocum, of Knoxville, Tenn.

Average thickness of vein 3 feet; Jellico vein.

INDIAN MOUNTAIN JELLICO COAL COMPANY, Jellico, Campbell County.

Chas. Livingston, President and Gen. Manager, Jellico, Tenn.
Dr. C. E. Ristine, Secretary, Knoxville, Tenn.
Perry Gorman, Bank Boss, Jellico, Tenn.

I have made several visits to this mine to make inspection, but have not been fortunate enough to find them in operation.

Prior to July, the company was known as Indian Mountain Coal Company. In July the company re-organized under name of Indian Mountain Jellico Coal Company.

The company has made a number of improvements this year. Mine is ventilated by furnace and shaft.

Average thickness of vein, 3 feet 6 inches. No report of output from January 1 to time of re-organization.

About 100 men employed on an average.

No map on file in this office, but one has been demanded.

WOOLDRIDGE JELLICO COAL COMPANY, Newcomb, Campbell County.

S. L. Wooldridge, President, Versailles, Ky.
S. L. Wooldridge, Treasurer, Versailles, Ky.
P. Wooldridge, Secretary, Louisville, Ky.
Jas. R. Wooldridge, General Manager, Newcomb, Tenn.
William Dinkelaker, Superintendent, Newcomb, Tenn.
Joseph Grael, Mine Boss, Newcomb, Tenn.

Mine inspected December 12, 1895.

Outlet at furnace, 18,690 cubic feet of air per minute; of this quantity 2,960 cubic feet came from the "McCracken Entry;" No. 4 entry 116 feet ahead of air currents. Several inlets to the mines.

The ventilating furnace and stack are in good order.

Several automatic mine doors are in use. The brattices and common doors required some repairs.

The following is report of inspection to the General Manager:

NASHVILLE, TENN., December 16, 1895.

Wooldridge Jellico Coal Company, Jas. R. Wooldridge, General Manager, Newcomb, Tenn.:

DEAR SIR—December 11 and 12, 1895, I made an official inspection of the coal mines operated by your company near Newcomb, Campbell County, Tennessee, and desire to call your attention to ventilation of same.

By a system of splitting of currents the number of doors on main haulage ways can be reduced, but without an accurate map of mine, showing all the entries, air-ways, rooms, doors, brattices, etc., it would be useless for me to attempt to give such a plan.

The ventilation is not sufficient at present.

I ordered double doors, made as air-tight as possible, on entrance to furnace from main gulch entry. I found the leakage of air very considerable at that place, besides each opening of the door breaks the current all over the mine. There are numerous leakages in the brattices that tend to lessen the power of your furnace.

The doors are not properly constructed and maintained, and require immediate attention. The water standing on entries must be removed, or all work stopped beyond the water. This point must be observed, for the men have just grounds for complaint when they are compelled to wade water going to and from their working places, and I feel it my duty to protect them in this matter.

I found entry No 4, 116 feet ahead of last break-through; this must be corrected in the future; in no case must a working place be over 75 feet ahead of the last break-through, or the air current.

I enclose copy of the mining laws of this State, and request a strict compliance with the requirements therein set forth. Your attention is invited to Acts of 1881, Chapter 170, sections Nos. 1, 2, 6, 7, 8, 9, 10 and 13.

Especial attention is invited to latter part of section 8, in reference to measurement of ventilating currents each week, and reports of same at end of each month, which must be complied with in the future, or the penalty as provided in section 10 will be rigidly enforced.

On receipt of your map I shall be pleased to submit a plan for more economical ventilation of same, which will be found to be the most satisfactory manner to conduct the work.

I found that the patent doors on left-hand entry near first parting were frequently left open a considerable length of time by the drivers leaving cars standing on the rails that operate the opening mechanism. This should be remedied at once.

Very reepectfully,
F. P. CLUTE, *Commissioner*.

The average thickness of vein is 3 feet 8 inches.

Mine was opened early in 1883; first coal shipped in summer of 1885.

Analysis of coal:

Volatile matter	35.44
Carbon	60.60
Ash	1.60
Moisture	2.36

The analysis was made by Prof. Peter in 1883.

Map has been filed in this office.

No indications of gas.

Elevation of seam about 1,300 feet above sea level.

November 16, 1895, Wm. Tweed, a miner, aged 29, married, with five children, had his spine dislocated at the junction of the twelfth "dorsal" and "lumbar vertebra." The tenth, eleventh and twelfth vertebra were crushed and the spinal cord torn in twain. J. L. Hefferman attending physician. Wm. Washburn was present. Newton Graham was first to reach the scene of accident. Tweed was sitting on a stool putting in a mining—the mining seam at the place he worked consisted of a "rash" parting between the upper and lower benches of the seam—when a "horse-back" fell out of the roof immediately above him, hitting him on the back; he died from effects of his injuries December 7, 1895. No inquest was held.

Falls Branch Jellico Coal Co., Campbell County.

Railroad Station, Oswego, Tenn.
Post-office, Newcomb, Tenn.

James R. Wooldridge, Receiver, Newcomb, Tenn.
A. W. Schenck, General Manager, Newcomb, Tenn.

Mine was inspected Dec. 11, 1895.

The following is the report of inspection made to the Receiver and General Manager:

NASHVILLE, TENN., Dec. 16, 1895.

Falls Branch Jellico Coal Co., A. W. Schenck, General Manager, Newcomb, Tenn.:

GENTLEMEN—I made an official inspection of the coal mine operated by your company near Newcomb, Campbell County, Tenn., and desire to call your attention to the following violations of the statutes of the State of Tennessee, as well as some necessary changes that should be made to better conditions:

1. There is no map or plan of the mine on file in this office, which is in violation of the Acts of Tennessee of 1881, chapter 170, sections 1 and 2. This must be complied with by January 1, 1896, for I have made verbal request for compliance with this section several months ago.

2. Same act and chapter, section 3, provides for two separate openings, or means of ingress and egress, at least 150 feet apart.

This section has not been complied with, but the second opening is now being driven from inside. (I would suggest that work be commenced on outside to open the required opening).

3. Section 6, same act and chapter, is not complied with.

4. Section 7, same act and chapter, provides for proper ventilation of the mines. The amount of air at inlet and outlet was sufficient, but the bad condition of all doors and brattices was such that no air reached the principal working places. The brattices require rebuilding or daubing; in fact, I found but one brattice that had ever been daubed.

All the doors should be rebuilt at once. At the first doors, the trapper leaves them standing open too long. I would suggest some change of doors, or the employment of more trappers.

The entrance to furnace from main entry has but one door, which is defective in every particular. There should be two doors on this entrance, and made as air-tight as possible. The stack over shaft must be rebuilt to a height of 45 or 50 feet, and made as air-tight as possible, not less than 5 feet 6 inches square on inside.

5. The mine boss does not remove the loose slate from the entries as he should; in fact, this matter should have immediate attention. All air-ways should be examined twice each month, and all obstructions removed. The measurements of ventilation are not made each week and reported to this office at end of each month, as required by section 8 of act and chapter above referred to. This must be complied with in the future, or the penalty provided for in section 10 will be rigidly enforced.

6. Section 9, same act and chapter, provides for the character of doors and guarding of same by trappers, as well as plan of ventilation. This mine should be ventilated by splits, and not by continuous current, as now done; this would reduce the number of doors, and be more satisfactory. In absence of map, no definite plan can be submitted by myself.

Section 10, same act and chapter, refers to several important items, among which will be found that no persons under 12 years of age are allowed in mines; also, please notice the enclosed act on employment of children in and around mines under 12 years of age (Acts of 1893, chapter 159). I found a colored boy, Orlanda Collins, son of Dan. Collins, 10 years of age; the boy was assisting his father in his working place, which makes him an employe of the company.

7. Section 13, Acts of 1881, chapter 170, has not been complied with.

I am willing to accept the report of any good, reliable boiler inspector, provided the boiler is put to hydrostatic test of at least 20 per cent. above ordinary steam pressure.

8. The inlet measured 9,360 cubic feet of air entering the mine, and 11,600 cubic feet at furnace outlet, but the leaks through doors and brattices were so numerous and large that no perceptible current could be found in many of the working places.

I ordered all men in advance of air currents should be stopped until the air was properly conducted to their working places. This must be complied with, or I shall be compelled to restrain such working by an injunction.

The entries must be cleared of mud and loose slate overhead.

I ordered a new stack over furnace, in order to increase the power of furnace, which will be required to properly ventilate the mine. This must be done at once.

It is my intention to make another inspection of this mine before February 1, 1896, and, unless all my orders are complied with, I shall be compelled to resort to the courts.

Very respectfully,
F. P. Clute,
Commissioner.

Newcomb, Tenn., Dec. 19, 1895.

F. P. Clute, Commissioner, Nashville, Tenn.:

Dear Sir—I note your letter of the 16th, and all matters mentioned therein shall have proper attention. The mine has had a thorough cleaning since you were here, and we have two men working on brattices and doors constantly, which will put them in good shape within a very short time. In regard to the map, you know I do my own engineering, and I fear that it will be almost impossible for me to get it ready by the first of the year. I have, as you know, a great deal of work to do, and it will require at least three days' constant work to do the surveying and make this map. I will do the very best I can, however, which will, I trust, be satisfactory. I have but one fault to find, or complaint to make against you and your letter; it is entirely unnecessary, with me, to add the last clause on page 4 of your letter. Your request that improvements and the work be done has just as much weight, and will complete the work as promptly as the courts could possibly compel us to do.

Respectfully yours,
A. W. Schenck,
General Manager.

Mr. F. P. Clute, Mine Inspector, Nashville, Tenn.:

Dear Sir—Enclosed find report on air measurements for first week of this month, and beg to advise that we have had the boiler carefully tested to 120 lbs., by Mr. E. A. Thomas, engineer and mechanic, our regular working strain being 100 pounds. He reports it to be perfectly safe up to this strain.

Respectfully yours,
A. W. Schenck,
General Manager.

Mr. F. P. Clute, Commissioner of Labor, Nashville, Tenn.:

Dear Sir—I take pleasure in advising you that we have now completed all of the work you requested us to do in and around our mine. All air-ways, doors and brattices, have been placed in first-class condition. A new stack has been put on the furnace, and entry No. 18 has been opened to the outside, giving two openings to the mine, as required. I regret to state, however, that I have not as yet completed our map. I have been fighting off an attack of la grippe for the past two weeks, and have really been unable to do the work necessary to finish the surveys. I hope to complete it within the next few days.

Respectfully yours,
A. W. Schenck,
General Manager.

Height above sea level, about 1,300 feet.

Mine was opened in April, 1891.

Average thickness of vein, 4 feet.

The doors were in very bad condition; not a brattice in the mine that showed any signs of ever having been daubed. Considerable loose slate in entries. The entries were in advance of airways.

The ventilation plan of this mine should be changed to the "split system," which will reduce the number of doors.

No indications of gas.

Several visits were made to this mine previous to date of inspection, but, finding the mine idle, I postponed my inspection until works were in operation.

FORK RIDGE COAL AND COKE COMPANY.

Mine near Hartranft, Claiborne County, Tennessee.

John Sanderson, President, Middlesborough, Ky.
P. Swab, Vice-president, Hartranft, Tenn.
J. Cockill, Secretary, Middlesborough, Ky.
Thos. Atkinson, Treasurer and General Manager, Middlesborough, Ky.
Thomas Pruden, Superintendent, Hartranft, Tenn.

This mine was inspected July 18, 1895.

The opening, tipple and part of the works are situated in Tennessee, but the larger part of the mine is in the State of Kentucky, but there is no opening in Kentucky.

At the time of inspection the mine was in a deplorable condition. Mr. Pruden had but recently taken charge, and he was in no manner responsible for its condition.

Report of inspection :

MIDDLESBOROUGH, KY., July 19, 1895.

To the Officers of the Fork Ridge Coal and Coke Company, Middlesborough, Ky.:

GENTLEMEN—I have made an inspection of your coal mine, called the Fork Ridge Mine, in Claiborne County, Tenn., and regret to report that its condition is such that I am forced to enter a protest against further operation of same until certain conditions now existing against the laws of the State of Tennessee are found to conform to the statutes. I desire to call your attention to the following evasions of the laws of Tennessee, viz.:

1. The ventilation is imperfect in every respect, and before any further work is done in the mines you must provide some means for the requisite amount of air to properly ventilate your mine—either furnace, fan, or some acceptable apparatus. All necessary brattices, doors, etc., must be erected in a good, workman-like manner, to properly conduct the air to every working face and every part of the mine in quantities to comply with Section 7, Chapter 170, of the Acts of 1881, of Tennessee.

2. The map on file in my office has been left with Mr. H. J. Welsh, E. M., of Hartranft, Tenn., to be delivered to your company when desired.

You must have a complete working map of all entries, rooms, air-courses, etc., made, as provided for in Acts of 1881, Chapter 170, Section 3, within the limits therein prescribed.

Had there been an accurate map of your mine at the mines, I should have been pleased to set out suitable plans to follow to put your mine within the limits of the State laws.

3. The mines must be properly drained of standing water.

4. The entries must be cleared up, all dangerous and loose slate taken down, and mud and water removed from entries.

5. Crib-work, built of heavy, sound timber, must be erected in room mouths, wherever the "stumps" or pillars show signs of crushing, and props set wherever required to make the entries safe for men working in the mines.

6. All men digging or mining coal in rooms, robbing stumps or pillars, or obtaining coal in any manner, except as shown below, must be stopped until the mine is put in a safe condition.

7. You may continue to drive entries or air-courses that are intended to improve the ventilation or drainage and cause your mine to comply with the statutes controlling mining operations in Tennessee.

8. You must provide openings as required by Acts of 1881, Chapter 170, Section 3.

I regret that the condition of your mine necessitates this action on my part, but the law must be my guide, and I must insist on a strict compliance with this order, or I shall be compelled to ask for an injunction from the courts restraining further operations.

Whenever you have completed the work herein ordered, advise me, and I will return and give the necessary orders to allow you to operate the mine.

I am, very respectfully,
F. P. CLUTE,
Commissioner of Labor and Inspector of Mines.

The company has carried out my orders so far as in their power. They have erected an 8-foot exhaust fan, made by Messrs. Thayer & Thayer, Charleston, West Virginia, which proves to be very satisfactory. They are making the second opening, or means of ingress and egress, as required by law, and, everything considered, much credit is due the superintendent for the many improvements inaugurated.

Mr. J. C. Richardson, E. M., Middlesborough, Ky., has been employed as mining engineer.

I made my second inspection Dec. 2, 1895.

THE TENNESSEE COAL COMPANY.

S. P. Evans, President, Knoxville, Tenn.
D. B. Bean, Vice-President and Gen. Man'g'r, Knoxville, Tenn.
H. B. Bowling, Superintendent, Briceville, Tenn.

KEYSTONE MINE, Briceville, Anderson County, Tenn.

First inspection was made July 25, 1895. Found about 75 men and 10 mules employed in the mine. No special attention was paid to ventilation or drainage.

Some working places were 50 yards ahead of air-ways. No fire was maintained in furnace, consequently no perceptible current of air in circulation.

A crush had started near the "Hart" entry, and had reached the main entry; no attempt had been made to check its work of destruction, and, after giving the superintendent certain orders about his ventilation, and checking the crush, I made the following report to the general manager of the company:

NASHVILLE, TENN., July 27, 1895.

D. B. Bean, Vice-President and General Manager Tennessee Coal Company, Knoxville, Tenn.:

DEAR SIR—I regret to report to you that the condition of the mine operated by your company, near Briceville, Tenn., is such that I am compelled to resort to the courts for an injunction, restraining you from operating the same, unless certain orders given your superintendent (H. B. Bowling) are carried out by the 6th day of August, 1895.

These orders were as follows:

1st. Repair furnace, increase height of stack, clean out all air-courses, erect doors and brattices wherever necessary to properly conduct the ventilating currents into the works, and put a fireman in charge of furnace, to keep a constant current of air of legal capacity through the works.

2nd. On main entry where "crush" is breaking entry "stumps" and endangering the loss of entry, I ordered cribs to be erected in mouth of rooms, and large props, 12 inches and over in diameter, to be placed close together (not over two feet apart), to prevent loss of entry and danger to men.

3rd. That trappers under 12 years of age must not be employed.

4th. That superintendent must erect and maintain double doors between shaft and main entry.

5th. That all mud and water must be removed from tracks.

6th. That in no case would break-throughs be allowed further apart than 75 feet, and that all air-ways must be of sufficient size and kept clear of debris. I must say that this mine is in the worst condition of any that I have visited, and, from what I can see, you have no person in charge that is competent to operate the same in a safe manner, and in accordance with the laws of the State, unless they are handicapped with orders from the owners.

Your prompt attention is requested to this matter.

I also gave the superintendent notice that he must supply a map of the mine, in accordance with the Acts of the State of Tennessee; also, that the ventilation must be measured and reported to my office, in accordance with the acts requiring same to be done.

I shall try and return to Coal Creek about the 6th of August, and hope to find the mine in proper shape, to save you the expense incident to legal proceedings.

Very truly yours,
F. P. CLUTE,
Commissioner.

KNOXVILLE, TENN., July 29, 1895.

Mr. F. P. Clute, Commissioner, Nashville, Tenn.:

DEAR SIR—Yours of the 27th inst. is received and carefully noted. The conditions which you mention as existing in our mines are entirely new to us. If the conditions are as bad as you claim they are. it would be impossible for us to make the improvements by the 6th of August, and if it is possible for us to make these improvements within that time, the condition of the mine cannot be as bad as you claim it to be. At any rate, there is no disposition upon the part of this company to operate a mine that does not come up to the requirements of the State laws in every particular, and if you had called the attention of this office to the matter earlier, any improvements that were necessary would have, no doubt, been well under way.

We have referred your letter to our superintendent, to know if the conditions reported by you are correct, and if we find that this is true, we shall certainly use our best efforts to remedy the matter at once. When you are in the city we would be glad to have you call in our office, in the Henson building, and let us become personally acquainted, and I feel safe in assuring you that you will find as little trouble with us in having us comply with our duty under the State mining laws as any operating coal company in the State. We very much prefer to know personally the people with whom we have to deal, and hope to have the pleasure of meeting you soon.

Yours truly,
D. B. BEAN,
Vice-President.

NASHVILLE, TENN., Aug. 1, 1895.

D. B. Bean, Vice-President Tennessee Coal Co., Knoxville, Tenn.:

DEAR SIR—In reply to yours of the 28th ult., allow me to say that the condition of your mine was as much of a surprise to me as it seems my report was to you.

However, I found other violations of the mining laws that I did not report.

In regard to time for making repairs, I considered ten (10) days (which time I gave your superintendent), sufficient time to erect doors, brattices, etc., and to make repairs to furnace and stacks. The crib-work and props that I ordered erected on main entry, to prevent the loss of entry, was a matter of more interest to your company than anyone else.

I have nothing to recall in reference to my report of your mine, and my guide in my work are the statutes relating to mining, and it is my intention to enforce those laws.

However, as it will be impossible for me to return to Coal Creek before the 12th or 13th inst., you will have until that time to make the repairs. Will call to see you on my return to Knoxville.

Very respectfully,
F. P. CLUTE,
Commissioner of Labor and Inspector of Mines.

KNOXVILLE, TENN., Aug. 2, 1895.

Mr. F. P. Clute, Commissioner, Nashville, Tenn.:

DEAR SIR—Your favor of the 1st inst. is received, and we have sent same to our superintendent at mines, with the request that he comply as near as possible within the specified time. Should be glad to see you when you come to Knoxville, and trust that conditions may be very much improved at our mines when you visit them.

Yours very truly,

D. B. BEAN,

Vice-President.

NASHVILLE, TENN., Aug. 19, 1895.

Mr. D. B. Bean, Vice-President Tennessee Coal Company, Knoxville, Tenn.:

DEAR SIR—Referring to my orders, transmitted to you July 27, 1895, and my letter extending the time of making the necessary changes in your mine near Briceville, Anderson County, Tenn., to make it comply with the statutes of this State, allow me to say, I have made my second inspection of your mines (August 14, 1895), and find that you have had but one-third of the necessary amount of air in circulation. I was forced to order your superintendent to reduce the number of men and mules in the mine to one-third, and that these men must work as near the entrance as possible. This was one of two courses left for me to pursue; the other course would have been to obtain an injunction against further operation of the mine until the laws could have been complied with; and the latter will be my course if you attempt to work a larger number of men and mules than one-third of the force you had in the mines Aug. 14, 1895, until all orders I have given are complied with. Below I give you the specifications of the work that must be completed before you can increase your force employed inside of your mines.

1st. You must rebuild your furnace, making same inside measurements 6 feet wide, 5 feet from top of grate bars to bottom of arch in front; length of grate bars 9 feet long, 6½ feet from top of grate bars to bottom of arch over back end of grate bars; build a bridge-wall 1½ feet above grate bars at rear end; arch must extend 8 or 10 feet in front of furnace and slightly expanded; continue arch to shaft, with same slope as over grate bars; the back end of furnace 15 or 18 feet from shaft. The stack on outside to be raised to 40 feet, and made air-tight. Cut all timber from around stack that may interfere with draught of same. Or, put in a fan, or any mechanical device that will insure 3,300 cubic feet of air per minute for every 50 men employed inside the mine, counting each mule equivalent to six men.

When this is completed advise me and I will examine and report to you.

All doors and brattices must be in a satisfactory condition. All air-ways must be cleaned out, so that the least cross section area shall not be less than twenty-five (25) square feet. All loose slate over entries, haulways and working places, must be taken down or properly propped. Along main entry, where the "crush" makes it possible that you may be compelled to abandon that entry, I would suggest that all "room-necks" be cleared out and crib-work of good oak timber be erected, and properly keyed to the top; besides, double the number of large props already set.

I shall demand at all times a strict compliance with the mining statutes of the State, and most earnestly request your compliance with these orders, which I assure you will save us both some annoyance as well as expense.

Very truly yours,
F. P. CLUTE,
Commissioner.

I am informed that the "crush" has ceased working, and that most of the repairs have been made.

Their reports of ventilation measurements show that some leakage occurs, which will be investigated at an early date.

BLUE GEM JELLICO COAL CO., Jellico, Campbell County.

E. Jameson, President and Manager, Jellico, Tenn.
W. W. Baird, Secretary, Jellico, Tenn.
Harry Wynn, Superintendent, Jellico, Tenn.
J. H. Vaughn, Mine Boss, Jellico, Tenn.

Mine was inspected Sept. 14, 1895.

Report of inspection to superintendent:

NASHVILLE, TENN., Sept. 21, 1895.

Harry Wynn, Superintendent Blue Gem Jellico Coal Co., Jellico, Tenn.:

DEAR SIR—I desire to call your attention to several violations of the mining statutes of the State of Tennessee I found existing in your mines.

1st. The State laws do not admit of natural ventilation. In no case must the working faces exceed 75 feet in advance of air-current.

2nd. No map of your mines are on file in my office, as required by law. I enclose you a copy of the State mining laws, and must request a strict compliance with the statutes. You must build immediately a good, modern furnace, or put in a suitable mechanical appliance to supply 66 cubic feet of air per minute for every man in your mine, counting each mule equivalent to six men. The furnace will require 23 square feet of grate bar surface, and the stack over your shaft must be 40 feet high.

Trusting you will comply with the statutes relative to mining in the future, I am,

Very respectfully,

F. P. CLUTE,

Commissioner.

The air was very bad in two entries which were being driven for connection. Forty-five men and one mule constituted the force worked in the mine.

Seam less than 24 inches thick (on an average).

The shaft in use is too shallow. The return air-way is separated from main entry by a "pack wall," and will always give trouble unless the shaft is placed elsewhere.

No map on file in this office.

Analysis of coal, by Prof. Kastle, Kentucky State College:

Moisture	2.65
Volatile matter	40.52
Fixed carbon	55.73
Ash	1.09
	99.99 (Sulphur, 0.71)

PINE MOUNTAIN COAL CO., Newcomb, Campbell County.

J. D. Rhodeheaver, Owner; Newcomb, Tenn.

About 30 men and 3 mules employed in mine. Seam is known as the Blue Gem.

Natural ventilation. No map on file in this office.

Mine was visited once to inspect, but it was not in operation.

ITALIAN BLUE GEM COAL CO., Jellico, Campbell County.

Thos. Zechini, General Manager, Jellico, Tenn.

This mine has not been inspected; was not in operation at time of my visit to that district.

EAST JELLICO COAL CO., Newcomb, Campbell County.

A. W. Smith, General Manager, Newcomb, Tenn.

This mine was not in operation at time of my visit to that section.

NEW DAISY COAL CO., Daisy, Hamilton County.

This mine was not in operation at time of my visit to inspect it.

A map has been demanded, but has not been filed.

No report has been made to this Bureau.

The work being done is robbing "pillars and stumps."

THE (PROVINS) BLUE GEM MINE, Jellico, Campbell County.

W. H. Provins, Owner and Operator, Jellico, Tenn.
J. B. White, Mine Boss, Jellico, Tenn.

This mine was inspected Sept. 14, 1895.

Men employed inside, about 25. Ordered mine boss to erect a door and some brattices to conduct the air-current to face of works.

The mine is connected with the Blue Gem Jellico Coal Company's mine.

Natural ventilation.

Notified the mine boss that a furnace must be erected to properly ventilate the mine.

Output about 40 tons per day.

No map on file in this office.

BATTLE CREEK COAL CO., South Pittsburg, Marion County.

B. F. Patton, President and Manager, South Pittsburg, Tenn.
W. C. Houston, Secretary and Treas'r, South Pittsburg, Tenn.
J. R. Wynn, Superintendent, South Pittsburg, Tenn.

The mines operated by this company are small, and the seam from 18 to 24 inches thick.

Natural ventilation.

No report, only as to output.

About 25 men employed.

The coal is hauled in wagons about two miles.

No inspection was made. At time the inspection was to have been made, found the mine idle.

No map on file in this office.

One of the mines is about seven miles west of South Pittsburg. It is locally known as the "Patton Mine." The coal is about 5 feet thick.

CHILHOWEE IRON ORE MINES, Cambria, McMinn County.

Operated by the Watts Steel & Iron Syndicate, Limited. Office, Middlesborough, Ky. R. T. Vann, Supt., Cambria, Tenn.

About twenty men are employed. The work is all surface work. 4,450 tons of ore were mined in 1895. Works were idle the months of February, March, April, May, June and July. No analysis given.

WATTS IRON ORE MINES, Cumberland Gap, Claiborne County.

Operated by the Watts Steel & Iron Syndicate, Limited. Office, Middlesborough, Ky. J. A. Jardine, Supt., Cumberland Gap, Tenn.

Inspected Dec. 5, 1895.

Mine No. 1 employs about 35 men. The vein pitches about 50 degrees, and the mining consists of drifts with the vein, running through the knob.

Mine No. 2, same character of work. No report of tonnage of output. The work is done mostly by contract.

Map of mines has been filed in this office.

One accident occurred in this mine. Dec. 3, 1895, William Carter, a miner, had the small bone of his right leg broken between knee and ankle. He was walking on the incline, and was struck by a "dummy" car. T. Hill and J. McBee were present at time of accident. Dr. Thomas was the attending physician.

The drifts or tunnels through the mountain are ventilated by natural ventilation.

BROWN MINING COMPANY, Cardiff, Roane County.

J. T. Tarwater, President, Rockwood, Tenn.
Sewell Howard, Vice-President, Cardiff, Tenn.
Polk Tarwater, Secretary and Treasurer, Cardiff, Tenn.
J. N. Baker, General Manager, Cardiff, Tenn.

Iron ore mine.

Inspection commenced Aug. 7, 1895. The mines are between Rockwood and Emery Gap; are known as the Pyott slope, Warner slope, Cardiff slope, No. 1 and No. 2 slopes. The ore vein lies at an angle of 45 to 75 degrees, quite irregular in dip and thickness. The deepest slope is about 575 feet, measured with the slope, with drifts every 100 feet right and left. The condition of the ventilation was extremely bad; in fact, the large amount of dynamite used, together with the radiation from the steam pipes leading to the pumps in lower levels, destroyed the small amount of air in circulation for breathing purposes.

The following is my report to the company:

NASHVILLE, TENN., Aug. 10, 1895.

Brown Mining Company, Rockwood, Tenn.:

GENTLEMEN—I regret that the conditions of your mines, "Pyott slope," "Warner slope," "Baker slope," "Cardiff slope," "No. 1 and No. 2 slopes," are such as to require me to order some ventilating device, other than present system of dog holes to surface, or natural ventilation.

By Oct. 10, 1895, you must have your mines ventilated by furnaces or fans, with the amount of circulation required by Acts of 1881, chapter 170, sections 7 and 8, and you must erect and maintain suitable doors and brattices to conduct the air to every working place.

By Sept. 10, 1895, I shall expect from you a certificate, in accordance with Acts of 1881, chapter 170, section 13, of every boiler used by your company in or around your mines or slopes.

The Acts of 1881, chapter 170, sections 1 and 2, require that an accurate map be kept of the mines, and one copy filed in office of mine inspector; or, by Oct. 10, 1895, I shall be compelled to proceed in accordance with the acts, unless the map is filed in my office by that time.

I cannot admit of any mine within my jurisdiction being operated with such means of ventilation as I found in yours, and have given you ample time to remedy the defects now existing. Any time I can be of service to you, and not otherwise engaged, will cheerfully come and advise with you relative to putting your mines in the condition required by laws of this State.

Black and white damp was clearly observed in Warren slope, and what I require and demand in name of the State may be a great saving to your company should any accident happen while your mines are in their present condition.

I herewith hand you copies of several blanks, and a copy of the mining laws of the State. * * *

Very truly yours,
F. P. CLUTE,
Commissioner.

The following was reply from company:

CARDIFF, TENN., Aug. 20, 1895.

F. P. Clute, Commissioner, Nashville, Tenn.:

DEAR SIR—Your favor of the 10th inst. was received and contents carefully noted, and in reply thereto I beg to say that we will make our best effort to comply with your demands.

We are considering the advisability of putting in an electric or compressed air plant, and are gathering data as fast as possible for that purpose. If we should adopt the electric system we should want a central station for generating and extending the currents to all the mines. Should we use compressed air we would of course have to put in a compressor at each slope. We think it would perhaps be preferable to us to use one of the above systems, for the reason that we would want to run a power drill instead of a ratchet drill, which we are now using. Should we, however, find that we are not able to use either of these systems, we will proceed at once to put in the fans and ventilate as you suggest.

Would it be satisfactory to you for us to have our boilers inspected by the boiler-maker and inspector of the Roane Iron Co., he making his return under oath? We have no Board of Boiler Inspectors in this immediate vicinity, nor do I know where we could get them, but the party above mentioned is thoroughly competent, as is also our own inspector, who looks after our boilers every week.

Will have engineer to go to work next week on the survey of different mines, and at the earliest day possible furnish you the the map as the law requires.

Would be glad to have you come to see us at any time, and in event of adopting either electricity or compressed air will wish your advice.

Mr. Baker is now out and I think would be able to go through the mines with you any time next week.

Respectfully,
THE BROWN MINING CO.,
J. T. TARWATER, *President.*

CARDIFF, TENN., August 26, 1895.

F. P. Clute, Commissioner, Nashvville, Tenn.:

DEAR SIR—I am now able to be out and have carefully gone over the question of ventilation, etc., at our various mines and find that a conversation with you regarding arrangement and the work in general would be beneficial. If you could possibly come over to see me in the course of the next week I would greatly appreciate it. Trusting an early reply from you, I am,

Respectfully,
J. N. BAKER, *Gen. Manager.*

The mines have been visited twice since the inspection in August. The company has made many improvements. I have insisted on the removal of all steam pipes from the slopes as a necessary protection to human life. The heat from the steam pipes disintegrates the slate roof, increases the temperature of the atmosphere, destroying the ventilation, and tending to increase the dangers to employes. In case of a fall of slate sufficient to break a steam pipe, it is quite probable that it would result in the death of all persons inside of the mines. Electricity or compressed air should be used.

The system of working is by stopes, with "pillars" and "stumps" to protect the slope and drift.

There have been four non-fatal accidents at the works, but no reports have been made to this Bureau as required by law.

BLACK DIAMOND COAL CO., Coal Creek, Anderson County.

T. H. Heald, President, Knoxville, Tenn.
W. F. Searle, Secretary, Knoxville, Tenn.
J. M. Andrews, Superintendent, Coal Creek, Tenn.
G. Murmann, Mining Engineer, Coal Creek, Tenn.
Lee Sexton, Mine Boss, Coal Creek, Tenn.
J. D. Jones, Fire Boss, Coal Creek, Tenn.

MINE NO. 2.—Mine inspected June 26, 1895.

Ventilation produced by furnace. The ventilation was ample, but some leaks occurred along the main entry.

The quality of the oil used was giving considerable trouble to the miners. It must have been of the poorest quality, or was adulterated by the miners.

There were 183 men and 18 mules employed inside, equivalent to 291 men, requiring 14,806 cubic feet of air per minute. The main inlet measured 17,748 cubic feet. At bull wheel on main entry, 13,164 cubic feet (this was after passing the first split). The outlet at furnace measured 18,900 cubic feet per minute.

This mine generates considerable gas, and a careful examination of the mine is made prior to the time for men to commence work each morning. All places containing gas are marked out.

ACCIDENTS FOR THE YEAR 1895.

Jan. 21, 1895.—Robert Jackson, aged 17 years, miner, had worked in Black Diamond mine about three weeks, was instantly killed by a fall of coal rash, etc., from face of his room. The fall buried him and crushed his head, causing death instantly. He was working as a miner on the same ticket with his uncle, W. T. Riddle, who was present at the time. S. R. Brooks and O. R. Stansbury were the first to reach the scene of accident. The Commissioner of Labor was notified.

CORONER'S INQUEST OVER ROBERT JACKSON.

Testimony of Lee Sexton:

Q. Were you present when Robert Jackson was taken from the room?

A. No, sir.

Q. How long until you went to where the accident occurred?

A. About twenty-five or thirty minutes, I suppose.

Q. Does Riddle keep his room properly timbered, and is he supplied with material to keep his room in a safe condition?

A. Yes, sir; his room, I would consider it propped safe, and he is furnished with material to keep it in a safe condition.

Q. Do you consider this an unavoidable accident?

A. Yes, sir, I do.

Q. Does this fire-clay and rash have to be moved at all places?

A. It does.

[Signed] LEE SEXTON.

Sworn to and subscribed before me, this Jan. 21, 1895.

J. M. TUTTLE, J. P.

Testimony of O. R. Stansberry:

Q. Were you present when Robert Jackson was killed?

A. No, sir, but I came in before he was moved, and he was lying with his face down, and a chunk of coal by his side; this coal being a part of the coal which had fallen, and probably the one that caused his death, together with the rest of the fall of coal and fire-clay. I did not help to get the body from under the fall, but I delivered the body to the outside in a bank car.

Q. Do you think that he came to his death through any neglect of bank bosses, or any bank officials?

A. No, sir, I think it only an accident.

his
O. R. + STANSBERRY.
mark.

Sworn to and subscribed before me, this Jan. 21, 1895.

J. M. TUTTLE, J. P.

Testimony of S. R. Brooks:

Q. Were you present when this young man was killed?

A. No, sir.

Q. Was he (Robert Jackson) dead when you got there?

A. He gasped once only.

Q. What do you think killed him?

A. A fall of coal and fire-clay.

Q. What amount of coal and fire-clay do you think fell on him?

A. I hardly know.

Q. Was the room well propped?

A. I think it was.

Q. Was he under the coal and fire-clay when you got to him?

A. He was under the fire-clay, and the coal was against his side.

Q. Did you help to take him out?

A. Yes, sir.

Q. Do you think any party or parties are responsible for his death?

A. I think not.

Q. Do you know whether he run a number or not?

A. I do not.

Q. Who was he working with?

A. Thos. Riddle, I suppose.

Q. What entry and room was he working?

A. Tuttle, or No. 21, left cross entry room 23.

Q. Do you know how long he had been working?

A. I do not.

Q. Do you know or believe he could have avoided the accident?

A. I do not know the situation of his coal, therefore I cannot say.

[Signed] S. R. Brooks.

Sworn to and subscribed before me, this Jan. 21, 1895.

J. M. Tuttle, J. P.

Testimony of W. T. Riddle, colored:

Q. Were you present when Robert Jackson was killed?

A. I was.

Q. Please state how it occurred?

A. I changed work with him and went to loading a car, and he went to mining. The room was mined about 18 inches deep, about 8 feet across the room near the roadway, and Robert went to mining on the gob side at the far end of the mining I had put in. I was at the front end of the car, and I saw him start toward the gob, and at that time there came a crack in the coal and I saw his light disappear; and I asked him if he was hurt, and got no reply; and I went to where he was and found about two or three cars of coal down, and I could not find him; I then went out to the entry and called for help to find him. Mr. S. R. Brooks was the first to get there. He and I began the search, and Mr. Brooks was first to find him.

Q. How old was he?

A. He was said to be about 16 or 17, but I think he was 17 or 18.

Q. Was he running a number?

A. No, sir.

Q. Was he employed by the company?

A. They had given me permission to work him, as I had partly raised him.

Q. Were mine bosses, or any mine official, in any way responsible for his death?

A. I do not think they are; I think it was only an accident.

Q. Was he a man of sound mind?

A. Yes, sir, I think he was.

Q. How far from gob rib was he when killed?

A. About 8 or 9 feet.

Q. Do you know this fall of coal and fire-clay to be the cause of his death?

A. Yes, I do.

Q. Did you think the coal dangerous when you left it?

A. No, sir, I did not.

Q. How long have you been mining coal?

A. About sixteen years, and working for this company about two years, and I believe I know when a place would be considered dangerous, and I consider this accident unavoidable.

Q. How thick was your coal?

A. About 3½ feet to four feet, and fire-clay about 18 inches, and

I think the coal and fire-clay threw him against the gob that caused his death.

Q. Do you mean the fire-clay is 18 inches, or the fire-clay and rash together?

A. I mean the two together.

[Signed] W. T. RIDDLE.

Sworn to and subscribed before me this January 21, 1895.

J. M. TUTTLE, J. P.

STATE OF TENNESSEE,
ANDERSON COUNTY. } An inquisition holden at Coal Creek, in said county, before J. M. Tuttle, J. P., upon the body of Robert Jackson (col.), who was killed in the Black Diamond Coal Mines, January 21, 1895, and we, the jurors, do say: We, the undersigned jurors, find, upon our oaths, from the best evidence, he came to his death by a fall of coal and fire-clay, which was an unavoidable accident.

In testimony hereunto, we set our hands and seals, this January 21, 1895.

J. R. CHILDRESS,
C. N. LEDFORD,
B. N. JOHNSON,
CHAS. MAMMETT,
WM. SPEARS,
H. M. WHITSON,
HENRY LYNCH,
Jurors.
J. M. TUTTLE, J. P.

March 11, 1895—Samuel R. Brooks, age 25, married, a miner by occupation, had worked in mines about 12 months, was burned by an explosion of fire-damp. The superintendent of the company reported that the accident was caused by Brooks going into his working place with open lamp lighted, in direct violation of the rules of the company forbidding any employe to pass the danger mark (X cross timbers thus), and despite warning of fire boss, who told him (and others) that he must not go in, as he had inspected their working place and found it dangerous; had properly marked it with the above danger mark. Brooks recovered, but is badly crippled and disfigured. Luke Leach and James Chadwick were slightly burned at the same time. J. M. Tuttle and G. W. Pickett were present.

April 22, 1895—William Fain (col.), 23 years old, a miner, and had worked in the mines four years, had his right leg broken above the ankle, and badly bruised on the back. A. Woods, J. L. Vowel and J. S. Duncan were the first ones to reach the scene of accident. His place was well propped, but a hidden defect, a "horse-back," fell from the top, with the above results.

June 10, 1895—John Smith, 45 years old, a miner, had worked in mine about one year, had his toes mashed by a fall of fire-clay and coal. Tim Davis was present. Lee Sexton was first to reach the scene off accident.

December 31, 1895—Frank Sharp, age 26 years, married, driver by occupation; he was driving three mules; had his leg broken just below the knee; he had worked in the mines about 30 days when the accident occurred. Sharp stated in presence of William Heath and Horace Johnson that it was due to his own carelessness.

This mine has been connected with a counter-heading from near Beech Grove mine, and is called "B. D. No. 1."

The company has been to great expense in opening the mine at the point above referred to, and it is their intention to have a model plant when completed. They will use a 10 foot exhaust fan for ventilating No. 1 and No. 2, abandon No. 2 main entry, and pull all the coal from the new opening at "Beech Grove," where they will erect a model chute.

BEECH GROVE OR PETRIE MINE.

Inspected June 27, 1895, and in August, 1895.

This is a small mine the lease of which was purchased by the Black Diamond Company, and has since been operated by them.

Twenty-three men employed, divided into two shifts.

The ventilation was poor and badly conducted through the works. I ordered several doors put up, a stack erected and fire maintained in furnace.

The top must be watched closely, for it is very dangerous.

No indications of gas.

Black Diamond Coal Co., Shamrock Mines, Briceville, Anderson County.

Mines inspected July 24 and August 14, 1895.

Forty-six men and five mules employed inside.

The ventilation was inadequate in every respect. I ordered a new stack, 45 feet high; a new furnace; airways cleaned out, and bratticed doors repaired.

At the time of my first inspection, the mines were being opened up after lying idle for some time. The superintendent commenced operation on repairs immediately, and on my second inspection the mine was in better condition, but all the repairs were not completed. I am informed that the company will erect a fan at an early date at this mine, which will insure a sufficient quantity of air.

This company is doing all in their power to keep their works in proper condition.

Maps are on file in this office, and a complete map of Nos. 1 and 2 and the Petrie mine is being prepared for this office, in place of the several maps now on file.

ACCIDENT IN SHAMROCK MINES.

June 17, 1895—James W. Ayers, age 38, married, miner by occupation, was killed by a fall of slate.

Testimony at coroner's inquest:

The witnesses in this inquisition having been sworn, deposed and testified as follows:

Gordon Ayers: I am the son of James W. Ayers, the man who was killed; don't know my age; was in our working place when the slate fell on him; heard the slate fall; could see my father's hand sticking out; he was making a noise, but couldn't speak; tried to lift the slate, but could not; had to go some distance to find some one to lift the slate, and found Luke Brown first, and Luke and others were getting him out when I next saw my father; they would not let me go up to him; the rock that fell on him looked like a "horse-back;" it was over the roadway where we worked; we were working on a stump; had our place well propped up, but could not prop on the roadway; the top was generally good where we were working, just like it is on all stumps; father was at work when the slate or top fell on him; am not able to read or write. (NOTE—The Bible record shows Gordon Ayers to be 15 years old.)

his
GORDON + AYERS.
mark.

Attest: C. B. Rice and M. L. George.

Sworn to and subscribed before me, this June 17, 1895.

J. M. TUTTLE, J. P.

John A. Brown—When I reached J. W. Ayers I found the slate on him. Noah Doherty and Robert White were there trying to get the slate off of him; think the slate was in one large piece. The slate was near the face of the coal. I raised the rock with a prop, and Noah Doherty pulled him out. The work was on a stump; the slate fell on what was intended for a roadway, as I understand it; the rock was a thick one, I think; didn't know much about the place; hadn't been there lately; I had to go some little distance; the slate must have been on him five or ten minutes.

[Signed] J. A. BROWN.

Sworn to and subscribed before me this June 17, 1895.

J. M. TUTTLE, J. P.

Luke Brown—Was in the Shamrock mine on the 17th of June, and was the first to reach J. W. Ayers after the slate fell on him; the rock that fell on him was what killed him, according to the best of my knowledge; he was not dead when we got him out; he talked some in my presence afterwards; he lived about half an hour or three-quarters after we got him out; he died before the doctor came; he lived until we got him out of the mines; there was no road in his place, but a roadway was left; the rock fell on this roadway; the thick edge of the rock was next to the coal, the feather edge next to Ayers; I considered that his place was timbered up as near as could well be, to leave room for work; had not been to his place for a week or two; he was leaving space for a roadway; did not examine the place after Ayers was hurt; he had timbers in his room; we used one to lift the slate off of him; I thought the rock to be what we call a horseback.

his
LUKE + BROWN.
mark.

Attest: M. L. George and J. F. Weatherford.

Noah Doherty—Went to J. W. Ayers' place of work this morning; I found him under a piece of slate about four or five feet wide and seven or eight feet long, about 12 to 18 inches thick; the place was propped up; the heaviest part of the rock was next to the face of the coal; it broke off four or five feet from the face of the coal; the thin part of the rock caught him; saw one surplus prop or timber in the room; we used it to get rock off with; I had to go about 150 yards to get to him after I started; he must have been under the rock about twenty minutes; he did not talk for two or three minutes after we got him out; he lived about one-half hour after the slate fell on him; he died on outside of mine after he had been taken out.

[Signed] NOAH DOUGHERTY.

Sworn to and subscribed before me this June 17, 1895.

J. M. TUTTLE, J. P.

James R. White—I work in the Shamrock mine—timbering—working on the road; had started to Ayers' place when Thomas White told me that the slate had fallen on Ayers: they had Ayers out when I got there; Ayers was slabbing a room pillar, aiming to slab down and draw the pillar back; the body of the rock lay next to the face of the coal; I told him not to go in until I pumped the water out; I told him that I didn't think it necessary for him to go in until we could clean up the falls and pump the water out; he said he would go and load the car he had, and then go home; he mentioned to me that he had the best top in the mines; this talk was on last Friday, the last day we worked till this morning; I considered the place safe, and don't think any blame could attach to any one for the accident; after he was hurt I asked him if he knew the rock was loose; he said he did not; he probably lived about three-quarters of an hour after he was hurt; he died on the 17th day of June, 1895, a little after 10 o'clock in the morning; I consider that the falling of the rock on him was the cause of his death; I examined the place after the rock fell, and it seemed to be good solid top all around; the thick part of the rock broke off near the face of the coal; he was a careful man, and I went to his place every day and examined it.

[Signed] JAMES R. WHITE.

Sworn to and subscribed before me this June 17, 1895.

J. M. TUTTLE, J. P.

STATE OF TENNESSEE,
ANDERSON COUNTY. } An inquisition holden before J. M. Tuttle, J. P., over the body of James W. Ayers, who was lying dead at his home in the town of Briceville, in the 13th civil district of Anderson County, who was killed in the Shamrock coal mine on the 17th day of June, 1895; we, the undersigned jurors, find from the evidence adduced before us, that the said James W. Ayers came to his death from an accidental fall of slate, which was purely accidental, and not the result of criminal or other negligence upon the part of any one else. We find that his right shoulder was broken, and he was generally mashed up internally.

R. J. LESTER,
THOMAS RICHARDS,
WILL SIMS,
D. S. LEINART,
W. T. ALVEY,
CHAS. HAMMETT,
his
JACOB + HALE,
mark.
Jurors.
J. M. TUTTLE, J. P.

Attest: To Jacob Hale, H. M. Madden.

Bon Air Coal & Coke Co., Bon Air, White County.

J. M. Overton, President and General Manager, Nashville, Tenn.
J. L. Dibrell, Secretary and Treasurer, Bon Air, Tenn.
J. L. Dibrell, Superintendent, Bon Air, Tenn.
A. H. Wood, Engineer of Mines, Bon Air, Tenn.

Mines No. 4 and No. 5 inspected Nov. 7th and 8th, 1895.

Report of inspection to superintendent:

Nashville, Tenn., Nov. 9, 1895.

Bon Air Coal and Coke Company, Bon Air, Tenn.:

Gentlemen—On Nov. 7 and 8, 1895, I made an official inspection of coal mines Nos. 4 and 5, owned and operated by your company at Bon Air, White County, Tenn.

By reference to the laws of Tennessee, Acts of 1881, chapter 170, sections 1 and 2, you will find the requirements in reference to maps of your mines. I left copies of the maps with your engineer, with instructions to complete them up to date, and send to my office on or before Jan. 1, 1896.

Section 6, same act and chapter, provides for a suitable wash-house for employes, which has not been provided at either mine.

Section 7, same act and chapter, provides for the amount of air to be furnished each man underground, also the measurement of the ventilating currents each week, and report same to my office at end of each month. This you have neglected to do, but I must insist upon having regular reports from you in the future.

Mine No. 4.—The ventilation of this mine is very defective, and must be improved at once. There is no excuse for the gross negligence on the part of your mine boss in allowing the conditions to exist that I found in this mine.

The main entry inlet measured 8,882 cubic feet of air per minute, and the same current at last cross cut, near head of back heading, measuring only 3,628 cubic feet, showing an actual loss of fully 50 per cent. of the air, after an ample allowance for friction.

The fan running 50 revolutions was exhausting from the mine 16,684 cubic feet per minute, performing fully 40 per cent. of work that was no benefit to the mine.

The works on the right of main entry were not receiving proper proportion of the air. This is caused by bad condition of doors, brattices, air-courses, etc. All doors and brattices must be rebuilt, and kept as air-tight as possible.

In No. 5 mine the doors should be rebuilt, and the brattices so arranged as to conduct the air to the workings.

The inlet current was 15,400 cubic feet per minute, the outlet current was 15,435 cubic feet, but the measurement of latter was not satisfactory, owing to the difficult place to measure the current.

Acts of 1881, chapter 170, section 13, provides for inspection of all boilers in and around the mines of this State, and certificate of inspection and condition to be filed in my office, at least every six months. I am willing to accept the certificates of the insurance company's inspector. Please have the inspector to send certificates to this office.

Section 19, same act and chapter above referred to, provides that "Any miner having charge of a working place in any coal mine or colliery, who shall neglect or refuse to keep the roof properly propped or timbered, to prevent the falling of coal, slate or rocks," is liable to imprisonment and fine.

You should call the attention of the inside men to this fact, and they to the miners, that all may know the penalty for violation of this act.

Very respectfully,

F. P. Clute, *Commissioner.*

Bon Air, Tenn., Nov. 22, 1895.

F. P. Clute, Commissioner, Nashville, Tenn.:

Referring to your favor of the 9th inst., would say that we are endeavoring to comply with the laws governing the operation of mines, as set forth in your letter. We have put up the door, as suggested by you, in the right-hand entry of No. 4 mine, and are having the brattices looked after, with the result that the air has been somewhat improved, but we hope to improve it further at an early date.

We have ordered matched lumber with which to rebuild all the doors in the mines, and shall endeavor to keep same up to the standard.

As yet we have not received anemometer, and are unable to make the measurements of ventilating currents as required.

We enclose herewith a copy of the last inspection of boilers by the Hartford Steam Boiler Inspection and Insurance Company, and will have certificates forwarded to you in the future. The inside foremen have been cautioned to see that the rooms are kept properly propped, to prevent falling slate. The maps, with extensions to date, will be forwarded to you on or before the time specified.

Yours very truly,

A. H. Wood,

Engineer of Mines.

The coal averages about 3 feet 3 inches in thickness. Two veins are worked, which lie about 20 feet apart.

The fans employed are 16 feet in diameter, one at each mine, made by the Vulcan Iron Works; engine 10x14 feet; fans run about 50 revolutions.

The fans are of sufficient size to properly ventilate larger mines, but the condition of brattices and air-courses was such that in the working places but little benefit was derived from the fans.

The company employ 12 mining machines, operated by compressed air, as follows:

Six Harrison's Coal Cutting machines; five Ingersoll and Sargent machines; one Jeffries machine. The latter was being operated on trial. The average tonnage of coal undermined by each machine per day runs from 20 to 25 tons.

The main entry of No. 5 mine is illuminated by incandescent electric lights. The electric plant also supplies lights to the town, operates jig screens in the chutes, an incline to top of mountain, and the pumps that supply the town and works with water.

Many improvements have been inaugurated on outside during the past year.

No reports of air measurements have been received.

Maps are being extended to date for use of this office.

The following accident happened at the Bon Air mines Feb. 23, 1895:

Bud Frazier, aged 23 years, married, with no children, had worked as a miner for five years, was injured by a blast, death resulting twelve hours later. Tom Frazier was an eye-witness to the accident. No inquest was held.

The accident was caused by a shot blowing through pillar on him. His father, Tom Frazier, and himself, had loaded three shots, and set them off and ran through the cross-cut into the adjoining room, stopping just opposite the shots, which blew through with above result.

TENNESSEE PAVING BRICK COMPANY, Robbins, Scott County.

T. H. Lesly, President, Chattanooga, Tenn.
Jno. S. Key, Secretary and Treasurer, Robbins, Tenn.

Mine inspected Nov. 21, 1895.

This company manufactures paving brick. Daily capacity, about 40,000 brick. The clay used in making the brick underlies the coal.

They were robbing their old mines and opening a new one. The coal output is consumed by the company. Coal is about twenty-two inches thick, and clay about four feet thick. Work about twenty men.

No map of mine on file in this office.

OAKDALE COAL & COKE COMPANY, Oakdale, Morgan County.

This company has just been organized, and will open up a coal mine about one-half mile from Oakdale.

No work done except prospecting.

MINES ALONG THE HARRIMAN & NORTHEASTERN RAILROAD, in Morgan County.

Burns & Son, of Harriman, Tenn., are opening a coal mine near above-mentioned road. No shipments of any importance made.

James Adcock, of Ruckner, Morgan County, Tenn., has opened a coal mine on line of above road, near Ruckner, in Morgan County.

Mr. Williams, of Ruckner, Morgan County, has opened a coal mine on line of above road, near Ruckner, Morgan County.

BRUSHY MOUNTAIN COAL Co., Joinersville, Morgan County.

This mine was opened up during past year. But little work has been done. The seam is the same as the State's mine.

NEW DAISY COAL COMPANY, Daisy, Hamilton County.

James G. Aydelott, Proprietor.

This mine was visited once, but was not in operation.

Complaint has been made that they are working on property belonging to the Chattanooga Land Company, Limited, the adjacent land owners.

Demand has been made for a map of the mines, but as yet no map has been filed in this office. Unless the map is supplied in a reasonable length of time, I will have survey made as required by the mining statutes.

BRYSON MOUNTAIN COAL AND COKE COMPANY, Middlesborough, Ky. Mine near Hartranft, Claiborne Co., Tenn.

T. Cockill, President, Middlesborough, Ky.
C. N. Evans, Vice-president, Middlesborough, Ky.
E. Cockill, Sec'y and General Manager, Middlesborough, Ky.
J. W. Cockill, Superintendent, Hartranft, Tenn.
Peter Derr, Bank Boss, Hartranft, Tenn.

Company not incorporated.

Mine inspected December 3, 1895.

The ventilation was in good condition, with exception of a few small leaks between main entry and return airway; ordered them fixed.

Outlet at furnace 13,050 cubic feet per minute.

The intake airways measured 12,695 cubic feet per minute.

This mine is in better condition than any mine in the Mingo District.

The company has done considerable work improving the main entry haulway and in draining their mine.

Some loose slate on entries required to be taken down.

Map on file in this office.

No ventilation reports received.

RELIANCE COAL AND COKE CO., Hartranft, Claiborne County.

Philip C. Swab, President and Treasurer, Hartranft, Tenn.
Ed. Saulsberry, Vice-president, Middlesborough Ky.
G. W. Saulsberry, Secretary, Middlesborough, Ky.
Philip C. Swab, Superintendent, Hartranft, Tenn.
John Gent, Mine Boss, Hartranft, Tenn.

On my first visit to this district this mine was idle, but on my second visit, Dec. 2, 1895, it was in operation and inspected at that time.

Average number of employes about fifty men, and three mules.

The seam worked is the Mingo (or Raulston); averages about five feet thick.

The ventilation is produced by a small "makeshift" for a furnace, and the ventilation is inadequate in every respect.

The company contemplates the erection of a new furnace at an early date, or the purchase of a fan for that purpose.

Some of the pillars are extremely weak.

A map is on file. No ventilation reports received.

I ordered the furnace or fan put in, doors and brattices repaired, and entries cleaned up.

No indications of gas.

EAGLE COAL COMPANY, Oliver Springs, Anderson County.

J. K. Butler & Co., Proprietors.

Mine operated under contract by Joseph Shelden & Sons.

Mine inspected September 20, 1895.

This is a small mine recently opened adjacent to old workings.

Number of men employed, 25; also two mules.

Output about 25 tons per day.

Report of inspection:

NASHVILLE, TENN., Oct. 4, 1895.

Messrs. J. K. Butler & Co., and Jos. Shelden & Sons, Operators Eagle Coal Company, Oliver Springs, Tenn.:

GENTLEMEN—You must build a furnace to ventilate your mines with. The furnace must not have less than 30 square feet of grate bar surface, properly arched over, with usual air spaces on each side. Erect a stack 5½ feet by 5½ feet, by 35 feet over the shaft.

No return air-way will be allowed with less than 25 square feet cross section area.

Have map prepared for my office, in accordance with Acts of 1881, chapter 170, sections 1, 2, 3, etc.

Make monthly reports of ventilation, in accordance with Acts of 1881, chapter 170, section 8.

Very respectfully,

F. P. CLUTE, *Commissioner.*

The map has been filed.

No reports of ventilation have been made.

The mine, when connected with the old works, will require close attention.

At time of inspection, no indications of gas.

POPLAR CREEK COAL CO., (Not incorporated), Oliver Springs, Anderson County.

Messrs. Queener Bros., Proprietors.

Inspection made Sept. 20, 1895.

Report of inspection:

NASHVILLE, TENN., Oct. 4, 1895.

Messrs. Queener Bros., Oliver Springs, Tenn.:

GENTLEMEN—Please erect a stack over your ventilating furnace, 40 or 45 feet high, 5 feet square, inside measurement. Repair furnace, and maintain a fire constantly.

You must put all doors in good, workman-like order, and maintain them that way.

Have map prepared of your mine, in accordance with Acts of 1881, chapter 170, sections 1, 2, 3, etc.

Please continue monthly reports of air measurements, as heretofore.

Respectfully,
F. P. CLUTE, *Commissioner.*

Map has been filed, and report of ventilation measurements made promptly.

At time of inspection there were 52 men and 3 mules employed inside, and no indications of the presence of gas.

The inlet current measured 4,370 cubic feet per minute, the outlet current 6,983 cubic feet per minute.

The superintendent exercises great care in the protection of his men.

OLIVER COAL COMPANY, Oliver Springs, Anderson County.

Joseph Richards, Superintendent, Oliver Springs, Tenn.

This mine was idle at time of my visit, consequently no inspection.

Map on file in office.

WINTERS' GAP COAL CO., Oliver Springs, Anderson County.

E. D. Phillips, Superintendent, Oliver Springs, Tenn.

Usually works about 20 men. The mine was idle at time of my visit, and was not examined.

No map on file in this office.

INDIAN CREEK COAL CO., Oliver Springs, Anderson County.

McFerrin & Bradford, Proprietors.
R. A. McFerrin, Superintendent, Oliver Springs, Tenn.

Mine inspected September 21, 1895.

This mine has natural ventilation, but the territory remaining to be worked out being very small and near the crop, and the limited number of men and mules employed admits of allowing the work to progress with that character of ventilation.

I ordered the mud and water cleared from entries, also loose slate to be taken down or propped along the entries.

Instructed them to carry air currents to faces of working places.

At time of inspection there were 2,700 cubic feet of air per minute passing through the mine.

The mine is located in a narrow ridge, and the entries are driven through the ridge.

At time of inspection 20 men and 2 mules were employed inside.

Map on file in this office.

PEACOCK COAL CO., Briceville, Anderson County.

Bowling Bros., Proprietors.

But one man and one mule employed in mine at time of inspection.

The mine has two openings to surface; entries and rooms are in bad condition; considerable loose slate in top of entries.

No map on file in this office.

NEW SODDY COAL COMPANY, Soddy, Hamilton County.

D. P. Montague, President, Chattanooga, Tenn.
H. S. Chamberlain, Vice President, Chattanooga, Tenn.
D. H. Rains, Secretary and Treasurer, Chattanooga, Tenn.
Jno. A. Rule, General Manager, Chattanooga, Tenn.
C. B. Finley, Supt. and Engineer in charge, Soddy, Tenn.
Thomas Morgan, Bank Boss, Soddy, Tenn.

Mines inspected September 10 and 11, 1895.

Report of inspection to the company:

SODDY, TENN., September 11, 1895.

C. B. Finley, Engineer and Superintendent New Soddy Coal Company, Soddy, Tenn.:

DEAR SIR—I have just completed my first inspection of the mines operated by the New Soddy Coal Company, at Soddy, Hamilton County, Tenn., under your management, and beg leave to call your attention to several questions that I consider are violations of the mining statutes of the State.

1st. Bunker Hill mine is ventilated by natural ventilation, which is not in accordance with the Acts of 1881, chapter 170, section 7. I find in this mine a furnace nearly completed, which should be completed at once; the stack over shaft to this furnace should be rebuilt, six feet square and forty feet high, made as airtight as possible and in a good workman-like manner; erect two separate doors between the shaft and entrance at the timber yard; erect other doors along main haulway where required to force the air to each and every working place; put a man at the furnace to fire same and maintain sufficient fire to give the legal amount of air to every man and mule, as required by the mining acts of Tennessee; this will require several brattices, which must be rebuilt in a good manner and maintained while mines are in operation; the entries must be cleared of mud and water in all the mines where work is being conducted, so that the miners can walk to and from their working places without wading in water; remove all loose slate from haulways and "room necks." The territory to be ventilated by the "Bunker Hill" furnace is a matter you can experiment on, but I would suggest that the present inlet near head of "engine plane" (main gulch entry) be used as the main inlet, until the arrangement can be perfected for a new inlet that will attach the "Smith" and "Dick Samuels" entry leading off No. 2 main entry to the Bunker Hill ventilation district. This would make the "Tom Reece" entry the main inlet to No. 2 ventilation district. However, you being better acquainted with the mines at this place than I possibly could be, you can arrange this in accordance with your own ideas, provided the proper amount of air is furnished the men.

2d. No. 2 Mine—The furnace is inadequate to do the work required of it, and in order to increase its capacity you must build a new stack, fifty or sixty feet high, six feet square inside, built air-tight as possible and in a good workman-like manner; also repair furnace, grate bars, etc., and put everything in good shape; brattice off all works on north side of No. 1 main entry; ventilate the works in head of same by return current from No. 2 (Cornbread) entry; brattice off a direct airway as possible, from head of "Bill Hallet" entry to head of No. 1 main entry, so as to prevent leaks from main No. 2 entry. I suspect that leaks exist from inlet to the air-course on south side of main No. 1 entry, which should receive immediate attention, and where necessary erect suitable brattices.

On No. 2 main entry another door should be erected between the present one and the furnace, and present door repaired.

I desire to call your attention to section 13, chapter 170, Acts of 1881, in reference to your boilers at mines and tipples, and request that you comply with this act; also to section 6, same chapter and act, in reference to wash-house for miners.

Please measure and report to my office, as required by Acts of 1881, chapter 170, section 8, the ventilating air currents.

Please have a tracing made of your new map of mines (scale 200 feet per inch) for my office, placing on same the property lines, all inside workings, doors; define air currents by "arrows," rope haulage, etc., in accordance to section 1, chapter 170, Acts of 1881.

I will provide you with all necessary blanks for reports, and appreciate prompt returns on your part.

Hope to return here in about 60 days, when I expect to find your mines in legal condition.

Very respectfully,

F. P. Clute, *Commissioner.*

The inlet to "Bunker Hill" mine measured 7,800 cubic feet per minute, the outlet 2,625 cubic feet; number of men employed inside, 55 and 6 mules, equivalent to 91 men, requiring 6,006 cubic feet of air per minute.

No. 2 mine, on Lewis' entry—there was in circulation about 3,750 cubic feet of air per minute—this is on main inlet airway; at one point on the Irvine entry there was no perceptible current; the outlet current at furnace measured 8,220 cubic feet per minute; volume required at that place 18,744 cubic feet per minute, there being equivalent to 284 men inside, and I found that a part of this air was drawn from the old works of No. 1 mine, none of it ventilating the present works.

The entries and airways were in bad condition in places, water and mud too deep for the men to walk through, necessitating them to ride in and out on the mine cars, an act that should not be allowed in any mine.

The mode of handling coal from mouth of mine to tipple has been greatly improved during the past year; the incline, overcoming 475 feet of grade, has been made continuous from mine to tipple. The momentum of the cars is controlled by an air brake similar to one employed at Whitwell mines. The incline is operated by gravity, supplemented with an engine when required.

The following letter explains what action the company has taken in reference to my orders:

SODDY, TENN., Dec. 19, 1895.

F. P. Clute, Commissioner, Nashville, Tenn.:

DEAR SIR—I will have map of mines completed before Jan. 1, 1896, and will forward same to your office.

I have carried out faithfully, as far as I was able, the instructions given me by yourself, in the matter of furnace stacks, hauling roads, brattices, etc., and am taking the measurements of air in entries and outlets with regularity.

I stopped the leakage from the old No. 1 mine, and the result was noticeable at once in our entries in No. 2 mine.

Yours truly,

C. B. FINLEY, *Manager.*

SALE CREEK COAL & COKE CO., Sale Creek, Hamilton County.

Sol Simpson, President, Baltimore, Md.
A. Simpson, Treasurer, Chattanooga, Tenn.
Wm. Griffiths, Secretary, Sale Creek, Tenn.
D. R. Griffiths, General Manager, Sale Creek, Tenn.
T. W. Price, Inside Foreman, Sale Creek, Tenn.
Wm. Rees, Outside Foreman, Sale Creek, Tenn.

Mine was inspected Nov. 12, 1895.

Report of inspection to the company:

NASHVILLE, TENN., Nov. 13, 1895.

Sale Creek Coal and Coke Company, Wm. Griffiths, Superintendent, Sale Creek, Tenn.:

DEAR SIR—Nov. 12, 1895, I made my first official inspection of the coal mines owned and operated by your company near Sale Creek, Hamilton County, Tenn.

I hereby acknowledge receipt of a map of your mines, as required by the Act of Tennessee of 1881, chapter 170, sections 1 and 2.

I desire to call your attention to several violations of the mining laws of the State, that must be observed by your company in the future.

Section 6, act and chapter aforesaid, provides for a wash-house for employes.

Sections 7 and 8, act and chapter aforesaid, provides for proper ventilation. The laws show plainly that some artificial means of producing the proper current must be employed. You must erect a suitable furnace, with a stack not less than 40 feet high, or put in a fan; either must be capable of supplying each person inside with 66 cubic feet of fresh air per minute, counting each mule as six (6) persons.

I shall expect this in operation before your ovens are fired.

The latter part of aforesaid section 8 provides for measurements and reports of your air-currents, which must be complied with, or I shall be compelled to enforce the penalty. In no case must you allow any working place to be advanced over 25 yards beyond the air-current. This must be strictly observed in the future.

Section 10, act and chapter aforesaid, shows penalty for failure to observe aforesaid acts.

Section 13, act and chapter aforesaid, requires semi-annual inspection of boilers, and reports made to this office.

Section 19, act and chapter aforesaid, shows penalty incident to failure of miner to properly prop his working place.

I shall expect and demand a close observance of all statutes relating to the operation of mines in this State. Herewith I hand you two copies of the mining laws of this State, blanks for air measurements, accident blanks, and copies of the child act.

Yours truly,

F. P. Clute, *Commissioner.*

At time of inspection the inlet at "Coke Oven Entry" was 3,120 cubic feet per minute.

Forty-five men and seven mules employed in mine, equivalent to 87 men. Amount of air required by statutes, 5,742 cubic feet per minute.

During a dull season the entries had been driven a considerable distance in advance of air-courses, consequently the men working in entries were deprived of proper amount of air. I requested the superintendent to stop entries and put the entry men on the airways.

The company have complied with my orders in reference to ventilation, and put in a fan. This gives an abundance of air.

The company have leased their coke ovens to the Dayton Coal & Iron Company, Limited, and the report of ovens will come under the head of that company.

Dec. 10, 1895, James Clouse was injured while, of his own accord, assisting in pushing a car loaded with machinery. He was not in the company's employ when accident occurred. A piece of machinery fell from the car, making a scalp wound on back of head, a slight depression of the skull, a small cut on the left eye-lid, several slight bruises on left side of face, and a cut on left wrist. He was not seriously injured, and was all right in a few days.

This mine was opened, and coal first shipped, in 1880.

Average thickness of vein, 4 feet.

ROYAL COAL & COKE COMPANY.

ROYAL MINE.

Geo. C. Heck, Receiver, Knoxville, Tenn.
J. D. Heck, Superintendent, Coal Creek, Tenn.
W. W. Leach, Bank Boss, Coal Creek, Tenn.

June 27, I visited the mines, but found that work had been suspended. Found a few men cleaning up the mine.

July 26, 1895, I inspected this mine and found working in the mine: 15 white miners, 65 colored miners, 4 white drivers, 2 colored drivers, 3 trappers, making 85 men in all, and 6 mules, equivalent to a total of 125 men, requiring 8,250 cubic feet of air per minute. The main inlet measured 8,640 cubic feet per minute, and outlet 13,100 cubic feet per minute, and only 2,260 cubic feet on main air-way, near head of works. This showed a bad leakage to return at fan.

Fan, 7 feet diameter (manufactured by Smyth Manufacturing Company), was running 170 revolutions.

See report to Geo. C. Heck, Receiver, as follows:

KNOXVILLE, TENN., July 29, 1895.

Mr. Geo. C. Heck, Receiver, Royal Coal & Coke Company, Knoxville, Tenn.:

DEAR SIR—I made an official inspection of your mine, called the "Royal," located in Campbell County, Tenn., and desire to call your immediate attention to the condition of the ventilation therein. The amount of air circulating through the mine is ample, but the conducting of the current to the working places seems to be totally disregarded, which is contrary to the mining laws of the State. You must have your superintendent take immediate steps to erect suitable brattices and doors, to force the requisite quantity of fresh air into each working place, and see that these doors and brattices are maintained in proper condition.

The laws require a map, showing all working places, entries, air-courses, etc., to be filed in my office. See chapter 170, Acts of 1881, sections 1 and 2, of Tennessee. Please attend to this at once.

The doors and brattices now in use require repairs, which should have immediate attention.

There is no report of condition of boilers in use at your mines on file in this office, as required by Acts of 1881, chapter 170, section 13.

Your superintendent, or mine boss, must measure the quantity of air in circulation in your mines, as required by Acts of 1881, chapter 170, section 8.

I shall make another inspection of your mine in a short time, and thall expect to find the mine run according to all provisions in our mining laws.

The part of your mine now worked under contract by Disneys Bros. & Co. I shall treat as part of your mine, and these orders are intended to cover the workings of same. * * *

Very respectfully,

F. P. CLUTE, *Commissioner.*

August 15, 1895, I made my third visit, and found the ventilation in better condition. Doors had been erected that put the current much closer to the workings, yet there was room for further improvement. I instructed the superintendent what to do, and since have not received any complaints from the miners.

COAL CREEK, TENN., Oct. 11, 1895.

F. P. Clute, State Mine Inspector:

DEAR SIR—We got a man instantly killed in the mine to-day. He had let the draw-slate project out over where he was mining several feet, and quite a chunk of it fell on him.

His name was Wm. McComb, a colored man; has been following mining several years; was 25 or 30 years of age; will be buried to-morrow.

I have no accident blanks.

Yours truly, J. D. HECK,

Supt. Royal Coal & Coke Co.

Oct. 17, 1895, I investigated the accident, and found that the colored man, William McComb, had been warned by the mine boss to take the slate down, but desired to let it remain, as the weight of slate made the coal work easier; and that he was ordered to take it down after he had removed the coal from under the slate. John Williams and Claude Earl were working with him, but Williams was absent at the time McComb was killed.

Earl said, "He tried to pull the slate down with his pick, but he could not do it, and he (Earl) refused to work under it for fear it would come down on him."

No inquest was held.

William McComb was not a resident of that vicinity, and, so far as known, had no relatives there.

STRIKE, APRIL 1, 1895.

A strike occurred at this mine April 1, 1895, and was maintained for three months.

The strike, at first, only involved the Royal Mine, but finally spread to the Cambria Mine, and involved about 300 men. The cause leading up to the strike was the unpopular management of the superintendent placed in charge of the Royal Mine about the first of January, but the actual cessation of work took place owing to his requiring the day laborers to work during the noon hour, paying for that hour the regular wages. Some two weeks after the strike was inaugurated, a small riot took place, in which one Hendricks was killed while attacking certain supposed company men; and later, one Craig was killed, supposedly from the same cause. An entire new force was employed, and work was resumed on or about July 1. The actual loss to the company, through guarding and keeping up the property through the strike, together with all unsuspended salaries, etc., was in the neighborhood of $500.00 per month. The loss to the laborers was not estimated, but must, of course, run very high, probably to $6,000 or $7,000 per month. Nothing was gained by either side, excepting the loss of time to the laborers and the loss of patronage to the company.

ROYAL COAL & COKE COMPANY, Coal Creek, Campbell County.

CAMBRIA MINES.

John E. Hightower, Lessee, Coal Creek, Tenn.

This mine was involved in the strike with the Royal Mine.

June 17, 1895, I visited the mines, and found them closed down; again, in July, I found them idle. Aug. 15, 1895, I made an inspection of this mine, and the following is my report to the lessee:

NASHVILLE, TENN, Aug. 19, 1895.

Capt. John E. Hightower, Lessee and Operator Cambria Mines, Coal Creek, Tenn.:

DEAR SIR—Aug. 15, 1895, I inspected the Cambria mines, operated by you, and find the ventilation imperfect in many respects. You must construct a new furnace, adequate to supply 3,300 cubic feet of air per minute for every 50 men employed in the mine, estimating each mule equivalent to 6 men.

Clean out all air-courses, that their cross section area shall not be less than 25 square feet.

Rebuild all doors in a good, workman-like manner, providing brattice cloth to make them air-tight as possible.

Put up another door on man-way from furnace to outside, and rebuild one in use. Take down all loose slate on entries, haulways, and in working places. You must supply this office with an accurate map of your mines, as provided for in State mining laws. I shall expect you to make to this bureau a monthly report of weekly measurements of your ventilating currents, as required by the State mining laws.

You must not work, or allow in or around the mines, any children 12 years old or under.

Please have your boilers inspected, and send report to this bureau, as required by law. * * *

Yours, etc., F. P. CLUTE, *Commissioner.*

Several complaints have been made to me in reference to the weight of cars. On examining them I found a few small cars that were used and averaged with the others, that was an injustice to the miners, so I made the following report to Capt. Hightower:

NASHVILLE, TENN., Aug. 19, 1895.

Capt. John E. Hightower, Lessee and Operator Cambria Mines, Coal Creek, Tenn.:

The variation in the weight of your mine cars is too large—from 730 to 1,020 pounds, when they are averaged at 900 pounds.

Could you not take out from service the small cars, and then re-average the weights? My attention was called to this, and I find it extremely unfair to many of the men.

Trusting that this can be complied with without any inconvenience, I am, Very respectfully,

F. P. CLUTE, *Commissioner.*

I found the principal inlet air-current measured 1,800 cubic feet per minute, and the outlet 3,300 cubic feet per minute.

On main entry, near first door, the inlet current measured 2,500 cubic feet. The doors were in such bad condition that the currents could not be measured satisfactorily.

The report of output from this mine is included in the Royal Coal & Coke Co.'s report.

FOX COAL & COKE COMPANY, Graysville, Rhea County.

C. H. Peabody, Receiver, Chattanooga, Tenn.
J. E. Line, Superintendent, Graysville, Tenn.
J. H. Cross, Mine Boss, Graysville, Tenn.

Mine was inspected Nov. 11, 1895.

Report of inspection to the company was as follows:

NASHVILLE, TENN., Nov. 14, 1895.

Fox Coal and Coke Company, J. E. Line, Superintendent, Graysville, Tenn.:

DEAR SIR—I made an official inspection of the coal mines owned and operated by your company, near Graysville, Rhea County. Tenn., and hereby call your attention to several violations of the mining statutes of the State of Tennessee I found existing at your mines, together with my orders pertaining to the improvements required to make them legal mines. I call your attention to Acts of Tennessee, chapter 170, sections 1 and 2. There is no map of your mines on file in this office, which must be complied with, as required by above referred to act.

Section 3, of the act and chapter aforesaid, shows that a mine must have two openings, at least 150 feet apart; also, shows in what manner the second inlet shall be driven. Both of your mines are in direct violation of this section, and you must proceed immediately to make the proper openings, as required by aforesaid section.

Section 6, of act and chapter aforesaid, provides for a washhouse for employes. This must be complied with at once.

Especial attention is directed to sections 7 and 8 of aforesaid act and chapter. Your mines are both illegal in respect to ventilation, for the law requires artificial means of ventilation.

Your mine, known as No. 1, operated under contract by Mr. Hugh Blevins, must have a 30-foot stack, 5 feet 6 inches by 5 feet 6 inches in the clear on inside, with a furnace of not less than 24 feet area of grate bars.

The air must always be in circulation within 25 yards of face of entry. According to aforesaid act, chapter and section, it becomes the duty of the mine boss to make weekly measurements of the ventilating currents, and monthly reports to this office. This you have not complied with, but must do so in the future.

Section 9, aforesaid act and chapter, provides for proper doors, etc.

Section 10, aforesaid act and chapter, shows the penalty for failure to observe above-mentioned acts.

Section 19 provides for punishment for failure of miners to properly prop their working places.

You must observe the mining laws very closely, to prevent proceedings from being instituted to enforce them.

I enclose copy of laws, blanks for air measurements, accident blanks, child labor act, etc.

Please file a map of your mine in this office by Jan. 1, 1896.

Yours truly, F. P. CTUTE, *Commissioner.*

The map was filed as requested. The stacks have been completed, and other improvements are under way, so I am informed by the superintendent.

Mine No. 2 is the Sewanee vein, about 22 inches thick.

Mine No. 1 is the Nelson vein (or a vein beneath the Nelson), about 32 inches thick.

There are 20 coke ovens in operation.

MONTEREY COAL CO., Monterey Mine, Putnam County.

A. J. Crawford, President, Terre Haute, Ind.
F. L. Kidder, Secretary-Treasurer, Terre Haute, Ind.
R. J. Moscrip, Superintendent, Monterey, Tenn.
Chas. Shelley, Mine Boss, Monterey, Tenn.

Employ 20 to 25 men inside, and one to two mules. Mine was opened in 1894; first coal was shipped in October, 1894. Vein is 1,850 feet above sea level; runs from 3 feet 4 inches to 4 feet 9 inches in thickness.

In July the men were out on a strike about ten days; no cause given to this Bureau.

Ventilation produced by fan. No indications of gas.

One miner (name not given) went back to a shot that hung fire, and it went off; his eyes were hurt badly, but are improving.

This mine has not been inspected; the information here reported was taken from annual report to this Bureau.

The following letter was received from the Superintendent:

F. P. Clute, Esq., Commissioner of Labor, Nashville, Tenn.:

Dear Sir—Enclosed please find yearly report of our mine. As you will see, it is only a small affair and does not cut much figure alongside of other Tennessee mines. Will try and get you a tracing next week.

You asked me in your letter of recent date to give you a short description of the mine. Our coal is on an average four feet thick, and lies almost on a level, but we are leaving a bottom strata of about eight inches that is not good. The mine was opened about two years ago, and so far has not paid expenses, as we have had no market until lately. It was opened originally by the Cumberland Mountain Coal Co., and transferred by them to the present owners, who have only been trying to supply the demand on the Nashville and Knoxville R. R. For the last month I have been shipping a few carloads to Nashville, but have not made much progress yet.

Mr. Crawford, our President, expects to build his railroad (Nashville and Knoxville) to his coal fields in Overton County this year. As soon as he does that this mine will be abandoned, as the Overton County coal is a very superior coal, and will certainly become a favorite in Nashville as soon as it becomes known.

Very respectfully,
R. J. Moscrip, *Superintendent.*

Glen Mary Coal and Coke Co., Glen Mary, Scott County.

John W. Appleton, President, Lexington, Ky.
J. P. Shaw, Secretary and Treasurer, Lexington, Ky.
A. I. Totten, General Manager, Glen Mary, Tenn.
George Heaps, Mine Boss, Glen Mary, Tenn.
Martin Heaps, Outside Boss, Glen Mary, Tenn.

Mine inspected November 15 and 16, 1895; 104 men were working in mine at time of inspection. Ventilation produced by a Brazil fan, 12 feet in diameter; average speed of fan, 60 revolutions; fan is run by a compressed air engine, water gauge reading 0.35 inch.

This mine is ventilated by continuous current; the power of fan is destroyed to some extent by leakage to return airway through some breaks to surface. I ordered the return airway to be made direct from fourth right-hand entry, putting overcast in at two entries and ventilating these entries by splits. What was intended for main air inlet failed to show a perceptible current. The overcasts are cheaper than the large number of doors and brattices required, and the result will be more satisfactory in the end, besides this plan will avoid the use of several doors. I gave the Superintendent such instructions as I could in absence of a complete and accurate map.

This plan will increase the ventilation in the works near head of mine; in fact, this was the only plan to avoid the leakage through the numerous breaks to surface. The area of return airway near fan is too small, so I ordered an increase in the airway at that point.

The volume of intake air could not be ascertained accurately; the outlet measured 10,875 cubic feet; on fifth right-hand entry the measurement showed 3,298 cubic feet; this shows the amount of leakage to be two-thirds of all the air passing through the fan, which was of no benefit to the men. The improvements will be made at an early date, and the map is being made.

October 18, 1895, Martin Tomlinson, Englishman, aged 25, married, 2 children, had worked in Glen Mary Mine about 10 years, and Joseph Minus, Englishman, 25 years old, married, had worked in these mines 8 years, were working in entry No. 9, and while tamping a hole, charged with loose powder, with an iron tamping bar, the powder was prematurely discharged. Tomlinson's head, arms and body were burned and torn with coal. Immediately after the accident Tomlinson assisted Minus back to where other men were working. Tomlinson died from his injuries 9 a. m., Oct. 23, 1895; Minus recovered. Magistrate T. N. Hughes declared that inquest was not necessary.

A visitor to these mines will notice the manliness of the boys, for a work is being accomplished that would be well for ladies at other mining and manufacturing towns to take example from, and assist the many boys found about such towns. I refer to the "*Merry-Makers' Club.*" It was organized in May, 1895, of boys of twenty years old and under; Mrs. Alfred Isham Totten, wife of the manager, being the directress. The main object of the club is to secure healthful and innocent amusement for hard-working boys, to teach them that they could have real down-right fun and nothing wrong in it. The boys call themselves the "Merry-Makers," and their motto is "Work while you work, play while you play." They meet every week at the house of the directress, who reads aloud for an hour from some amusing and interesting book or paper, and then all play games for another hour. During the summer months, with aid in money and work from other employes of the company, a comfortable room has been built for the use of the "Merry-Makers." It is well lighted and furnished with books and games, such as crockinole, checkers, parchesi, etc. The boys are living up to their motto, and are working better than they ever did before.

This mine was opened in 1880; first shipments occurred in 1881.

Height above sea level, 1,477 cubic feet at mouth of mine; lowest point in mine, 1,410 cubic feet.

Average thickness of vein, 3 feet 6 inches.

Analysis of coal:

Moisture	1.10
Volatile matter	41.35
Fixed carbon	55.00
Sulphur	0.70
Ash	1.85

These analyses were made Oct. 31, 1895, by World's Fair, Chicago, Ill.

Analysis of coke, same authority:

Carbon	88.42
Sulphur	1.16
Moisture	0.05
Phosphorus	0.015
Ash	9.635
Volatile matter	.72

Since October 1 a great improvement has been made in the coke. Only slack and pea coal is used for making coke; this is disintegrated, causing a marked improvement in appearance, strength, cell structure and in quantity produced from the coal. It is highly recommended by the furnaces and foundries using the coke.

TENNESSEE COAL, IRON & RAILROAD COMPANY.

President, Nat. Baxter, Nashville, Tenn.
Vice-president, A. M. Shook, Nashville, Tenn.
General Manager, G. B. McCormack, Birmingham, Ala.
Assistant General Manager, J. L. Gaines, Nashville, Tenn.
Superintendent of Mines, E. O. Nathurst, Tracy City, Tenn.
Engineer of Mines, Chas. E. Bowron, Tracy City, Tenn.

SEWANEE MINES, Tracy City, Grundy County.

Mine Boss, H. B. Thompson.

Inspection commenced August 27, 1895.

Mine No. 1—This mine has been worked to extent of its territory. There were working in the mine at that time 27 men and seven mules. Ventilation was by natural draught, through various openings to outside; ample for number of men and mules employed. The work consists of drawing pillars and stumps. Joe Sisk had a contract working some crop coal near chute; employed four men and one mule.

Mine No. 2—This mine has been worked to the extent of its territory; present work consists of robbing old works of stumps and pillars. In one place they were driving an entry to shorten the haul from head of works. There were working in the mine 85 men and 18 mules. Ventilation produced by furnace. The general conditions were very fair, considering the circumstances.

Mine No. 3—George Sitz has contract working some crop coal; employed 6 men and one mule.

East Fork Mine—J. D. Wiley, Mine Boss. This mine was not being worked to any extent at time of inspection.

Lone Rock Mine—H. B. Thompson, Mine Boss. Aug. 29, 1895, in head of main entry, about 20 men were mining out coal that had been left along the "crop" at the time the mine was worked with convicts. A. D. Hargis had a contract to draw "stumps" and "pillars" on the main shaft entry; employed 25 men and 7 mules. Ventilation produced by furnace, ample for number of men and mules employed; 12,000 cublic feet of air at (outlet) shaft.

Mine No. 10—J. D. Wiley, Mine Boss. Inspected August 27 and 29. Mine worked by State convicts. The condition of mine is shown by the following report to superintendent:

NASHVILLE, TENN., Aug. 31, 1895.

E. O. Nathurst, Superintendent Tennessee Coal, Iron & Railroad Company, Tracy City, Tenn.:

DEAR SIR—I have made an official examination of the Tennessee Coal, Iron & Railroad Company's coal mines, located at Tracy City, Grundy County, Tenn, and I desire to call your attention to the ventilation of mines Nos. 10 and 11.

August 27 and 29, No. 10 mine, by careful measurements, showed at inlet 7,400 cubic feet of air per minute, and 8,460 feet at outlet. I found in the mine 115 men and 10 mules, equivalent to 175 men, which number of men requires 11,550 cubic feet per minute at inlet, according to Acts of 1881, Chapter 170, Section 7.

The furnace is inadequate to supply the proper amount of air, and should be rebuilt at once, or some mechanical device, as a fan, should be erected that will insure the legal amount, as per statutes above referred to. The doors, brattices and airways should have constant attention to prevent the loss of air by leakage.

The trappers leave the doors open longer than necessary, which should be remedied at once.

The return air-way approaching the furnace is too small in area of cross section, for no "air-way" or "break-through" should be less than 25 square feet in area of cross section.

No. 11 mine (worked by convicts). August 27 and 30, 1895, I inspected this mine, and as there are several inlets to the mine through the works of East Fork mine, as well as the main entry, no measurements of inlets were taken; but as the outlet at furnace showed but 5,850 cubic feet of air per minute, and allowing the customary 10 per cent. for increase in volume of return air, would give 5,275 cubic feet for the inlet, against 13,530 cubic feet, the amount required by the statutes.

There were working in the mine 133 men and twelve mules, equivalent to 205 men. The furnace and stack are inadequate for the work and must be rebuilt at once, or some mechanical device must be put in to ventilate the mine properly and according to law.

Please have some suitable place provided for making up the cartridges by the powder men other than on the entry, where there is so much passing by the men.

Nos. 10 and 11 mines should be supplied with brattice cloth to curtain the doors (openings to rooms), and force the air to head of cross entries. I refer to the kind of cloth used in the Thomas mine, at Whitwell, and other mines in the State.

I claim this necessary when mines are worked on single entry system, and air courses are made by breaking through between parallel rooms.

The maps of your mines, heretofore filed in this office, I left with you for extensions of work since they were made. Extensions are to be put on up to July 1, 1895. When completed, return to this office.

I will accept the boiler inspections of the company's inspectors that carries the insurance of same, provided they are made in the manner provided by Acts of 1881, Chapter 170, Section 13.

I must insist that immediate steps be taken to increase the ventilation of No. 10 and No. 11 mines, and when completed, would be pleased to have you advise this office of the fact, and I will return and re-examine the mines. Herewith I enclose ventilation blanks, which should be filled out for the year 1895, if your engineer has taken weekly measurements; if not, commence September 1, 1895, and make reports according to Acts of 1881, Chapter 170, Section 8.

Very respectfully, F. P. CLUTE,
Commissioner of Labor and Inspector of Mines.

A test of the capacity of furnace to No. 11 mine, no allowance for friction, was 15,381 cubic feet per minute. I ordered the doors on main entry changed, and several changes that would make a great improvement in the ventilation.

The return air-way to No. 10 furnace has been enlarged.

No reports of ventilation have been received.

The maps of mine are on file in this office.

The company has leased and are operating the Ramsey mine, the property of the Nashville, Chattanooga & St. Louis Railway Company. It lies adjacent to their property at Tracy City.

THOMAS MINE, Whitwell, Marion County.

G. H. Crozier, Superintendent, Whitwell, Tenn.
John Wilkes, Mining Engineer, Whitwell, Tenn.
Joe Cain, Mine Boss, Whitwell, Tenn.

Inspected Aug. 21 and 22, 1895.

Report of inspection:

NASHVILLE, TENN., Aug. 23, 1895.

A. P. Gaines, Superintendent Tennessee Coal, Iron & Railroad Company, South Pittsburg, Tenn.:

DEAR SIR—I made an inspection of the Thomas Mine, at Whitwell, Marion County, Tenn., owned and operated by the Tennessee Coal, Iron & Railroad Company, and I desire to call your attention to the ventilation of said mines, and trust you will take steps to increase the amount of air entering said mines to amount required by State statutes.

No. 1 mine, on Aug. 21, 1895, had 9,251 cubic feet of air entering inlet per minute, and, according to State statutes, should have had 12,672 cubic feet per minute, being 66 cubic feet per minute per man inside, and each mule equivalent to 6 men. The power of furnace was measured and found to be 13,068 cubic feet per minute (without air-course friction). I believe the power of furnace can be sufficiently increased to meet the requirements of the statutes for some considerable time to come, by the erection of a 35 or 40 foot stack of sufficient area and properly constructed.

No. 2 mine and No. 3 mine are ventilated as one mine. The intake was found to be 9,270 cubic feet per minute at No. 2 main entry, and at No. 3 inlet air-course the current was not sufficient to revolve the anemometer.

The men and mules employed in these mines are equivalent to 350 men, which requires an inlet of 23,100 cubic feet per minute. I believe the best plan would be to divide No. 2 and No. 3, making each a separate mine so far as the ventilation is concerned.

You could construct a furnace near present head of No. 3 mine to ventilate this mine.

Rebuild the furnace in No. 2 mine, with larger grate bar surface, higher and wider arch; have furnace at least 15 feet from bottom of shaft; give the top of arch a good slope upwards towards the shaft; all air-courses and "dog-holes" (or break-throughs) should have, at least, a cross section area of 25 square feet; "dog-holes" should not be over 75 feet apart.

Please prepare a map up to July 1, 1895, (or to present time) of your mines for this office, showing name of entries, number of rooms, location and area of each split, location of each bridge (air over cast), location of every door, and the direction of all air-currents.

Please have mine boss fill out, on ventilation report blanks, from this book the measurements taken which have not been reported to this office.

I trust you will favor this office with a prompt report of weekly measurements of ventilation each month, as required by law.

The law is very plain in reference to amount of air required, and I trust the matter will have immediate attention on your part.

I hope to make another inspection of your mine in October, when, I trust, I will find everything in better condition.

I desire to compliment your superintendent and mine boss on the careful manner in which their inside work is conducted. I find in the mine, all doors and brattices erected in better shape and the works conducted in the most regular and systematic manner of any mine I have visited in the State.

Very respectfully, F. P. CLUTE,
Commissioner of Labor and Inspector of Mines.

The improvements that have been made in the ventilation will be seen by the following measurements reported to this office by the mine boss:

September, 1895.—No. 1 mine: the average inlet current for that month was 12,775 cubic feet; amount required by law, 11,352 cubic feet. Nos. 2 and 3 mines, the average inlet currents were 11,679 cubic feet; amount required by law, 16,236 cubic feet.

October, 1895.—No. 1 mine: the average inlet current for that month was 14,227 cubic feet; amount required by law, 12,144 cubic feet. Nos. 2 and 3 mines: the average inlet currents were 18,782 cubic feet; amount required by law, 17,556 cubic feet.

November, 1895.—No. 1 mine: the average inlet current was 15,349 cubic feet; amount required by law, 11,814 cubic feet. Nos. 2 and 3 mines: the average inlet currents were 22,204 cubic feet; amount required by law, 17,820 cubic feet.

December, 1895.—No. 1 mine: average inlet current was 15,777 cubic feet; amount required by law, 11,946 cubic feet. Nos. 2 and 3 mines: the average inlet currents were 20,048 cubic feet; amount required by law, 17,952 cubic feet.

Drainage is by gravity, with the exception of four hand-pumps.

This mine is worked on the double-entry plan, and it might be well for some of the operators to examine this mine, for, all things considered, this is the model mine of the State.

COAL CREEK COAL COMPANY.

E. C. Camp, President, Knoxville, Tenn.
D. B. Bean, Secretary, Knoxville, Tenn.
A. H. Bowling, Superintendent, Coal Creek, Tenn.

FRATERVILLE MINE.

J. F. Conway, Mine Boss, Coal Creek, Tenn.

Inspected June 25th, 1895. Amount of air entering at main intake (main entry), 5,580 cubic feet per minute; 102 men employed in mine that day, and 8 mules—equivalent to 150 men. Necessary amount of air, according to statutes, 9,900 cubic feet per minute. At last "break-through" on main entry, no perceptible current. Main entry 120 feet ahead of air-current. The leakage to furnace from inlet was fully two-thirds of the amount of air entering mine at inlet, none of which passed through the works.

Report to President E. C. Camp:

NASHVILLE, TENN., July 1, 1895.

E. C. Camp, President Coal Creek Coal Co., Knoxville, Tenn.:

DEAR SIR—Having made an inspection of the Fraterville Mine at Coal Creek, Tenn., the property of the Coal Creek Coal Company, I desire to call your attention to several facts in connection with this mine.

1st. The ventilation is inadequate and imperfect. At time of my inspection I found 5,580 cubic feet of air per minute entering the mine at main inlet, and at last break-through the current was not sufficient to measure the air with anemometer (or less than 500 cubic feet per minute). This shows a loss of leakage through doors and brattices to the return that deprives the men working near head of mine of the proper amount of air.

2nd. The return air-way should be cleared of fallen slate at several places, to prevent the retarding of current. At time of my examination the outlet current, near furnace, was 8,960 cubic feet per minute.

3rd. The furnace should be rebuilt, with larger area over the fire, and larger area of grate bar surface. The man-way from furnace to outside should be trapped by two separate doors, put up in good, workman-like manner.

4th. The stack over shaft is contracted too much at top, but by increase of furnace this can remain as it is until you have an increased number of men and mules inside. All connection with adjoining mines must be securely bratticed as air-tight as possible.

5th. Please have prepared an accurate map of your mine, in accordance with the Acts of 1881, chapter 170, sections 1 and 2.

6th. The mining boss must make weekly measurements of the ventilation and report same to this office at end of each month, in accordance to Acts of 1881, chapter 170, section 8. Blanks for said reports are herewith enclosed.

7th. Please have boilers at your mines inspected, and report to this office, in accordance with Acts of 1881, chapter 170, section 13. I herewith hand you copy of the mining laws of this State, and trust you will give your superintendent instructions to comply with these laws.

Very respectfully, F. P. Clute,

Commissioner of Labor and Inspector of Mines.

The last survey of the mine was made four or five years ago and no map had been filed in this office. Aug. 13, 1895, I made my second inspection and found no improvement in condition; some work had been done, but not sufficient to improve the conditions shown in above report. The company concluded to abandon the furnace and shaft then in use and open a new shaft between Fraterville and Thistle mine, so as to ventilate both mines with one furnace, as they contemplated leasing additional territory and extending their mines. Work was commenced on this shaft in August, but no report of its completion has been filed in this office.

This mine is very dry, and should be sprinkled, or the dust cleaned up and taken out of mine. No indication of gas, although adjacent works have had trouble in that respect. The company has made very slow progress in improvements.

The following are the measurements of ventilating currents reported by A. H. Bowling, Superintendent, Oct. 10, 1895: At inlet, 7,992 cubic feet; on 12th entry, 4,761 cubic feet; near face of 11th entry, 4,596 cubic feet; upper end of 9th entry, 4,874 cubic feet; at face of 4th entry, 4,521 cubic feet; at furnace, 10,378 cubic feet. (No report of men and mules).

Air measurements for December, 1895, as reported by A. H. Bowling, Superintendent:

Number of men, 93; number of mules, 9; equivalent to 147 men. Requisite volume, according to statutes, 9,720 cubic feet at inlet.

First week's measurements—Main entry (inlet), 8,012 cubic feet; crosscut at 12th entry, 4,640 cubic feet; crosscut at 11th entry, 4,520 cubic feet; crosscut at 10th entry, 3,953 cubic feet; crosscut at 9th entry, 4,814 cubic feet; crosscut at 8th entry, 3,062 cubic feet; crosscut at 4th entry, 4,219 cubic feet; furnace (outlet), 10,305 cubic feet.

Second week's measurements—Main entry (inlet), 8,251 cubic feet; crosscut at 12th entry, 4,832 cubic feet; crosscut at 11th entry, 4,627 cubic feet; crosscut at 10th entry, 4,001 cubic feet; crosscut at 9th entry, 4,897 cubic feet; crosscut at 8th entry, 3,105 cubic feet; crosscut at 4th entry, 4,193 cubic feet; furnace (outlet), 9,683 cubic feet.

Third week's measurements—Main entry (inlet), 8,109 cubic feet; crosscut 12th entry, 4,522 cubic feet; crosscut 11th entry, 4,413 cubic feet; crosscut 10th entry, 3,861 cubic feet; crosscut 9th entry, 4,711 cubic feet; crosscut 8th entry, 3,191 cubic feet; crosscut 4th entry, 3,917 cubic feet; furnace (outlet), 11,615 cubic feet.

Fourth week's measurements—Main entry (inlet), 8,317 cubic feet; crosscut at 12th entry, 4,719 cubic feet; crosscut at 11th entry, 4,521 cubic feet; crosscut at 10th entry, 3,924 cubic feet; crosscut at 9th entry, 4,865 cubic feet; crosscut at 8th entry, 3,260 cubic feet; furnace (outlet), 12,719 cubic feet.

The improvement shown above is below the required quantity, but the improvement is worthy of note.

In December, 1895, the company filed a map of Fraterville and Thistle Mine, the accuracy of which has been questioned, and an accurate map demanded of the company.

THISTLE MINE.

A. H. Bowling, Superintendent, Coal Creek, Tenn.
Daniel Fulton, Mine Boss, Coal Creek, Tenn.

Adjacent to Fraterville mine, connected at one point, operated by same company. This mine was inspected July 24, 1895; 42 men working in the mine, including 3 boys working as trappers, 1 of whom was Henry Davis, who was under 12 years of age. There were in mine 4 mules; these, with men employed, were equivalent to 66 persons necessary to provide air for; requiring 4,356 cubic feet per minute. The air entering mine was less than half the required volume, and no perceptible current was found at head and in the works. Main entry was about 200 yards ahead of return airway at sixth left-hand entry. The return airway was blocked by a fall between the second and fourth left-hand entries, and a new airway was being made between these entries. At one point the return airway had a cross section area of eighteen square feet, in violation of the statutes, which require the least cross section area of return airway to be twenty-five square feet.

After a thorough investigation I found that a larger part of air passing through the furnace was entering by an abandoned entry, called the "mud entry," and thence through some old fallen works direct to furnace, not ventilating any working places. The volume of air passing furnace at that time measured 5,625 cubic feet per minute. The brattices beyond sixth left were destroyed by an explosion in the mine about one year before the inspection; but no work was in progress in this part.

Report to E. C. Camp. President:

NASHVILLE, TENN., July 29, 1895.

E. C. Camp, President Coal Creek Coal Company, Knoxville, Tenn.:

DEAR SIR—The ventilation of your mine at Coal Creek, called the Thistle mine, is very imperfect, and far below the legal amount required. I find that the air courses in many places are below the the legal requirements. The doors, brattices, air courses, and entries are in very bad condition, and no attempts are made to conduct the air into the working places. After the best study I could give the matter, in absence of a complete map of both mines (Fraterville and Thistle), I have arrived at the conclusion that it will be economy to your company, and give better results, to ventilate the mines separately, unless you employ a fan for that purpose. The latter would be cheaper in the end and more satisfactory, especially as you contemplate acquiring other tracts and extending your mines beyond their present limits.

I hope you will investigate the fan matter, and take every step necessary to put your mines in shape to be legal ones, under the mining statutes. I will call to see you one day next week, and talk this matter over with you.

In this mine I found a trapper under 12 years of age, which is contrary to the statutes of this State, and a matter that I cannot tolerate in the future.

Please instruct your Superintendent that no work shall be done seventy-five feet in advance of an airway, and that air must be kept up to "face" by suitable doors and brattices; also that no entry or airway shall be driven with less sectional area than twenty-five (25) square feet. Very respectfully,

F. P. CLUTE,

Commissioner of Labor and Inspector of Mines.

The furnace used to ventilate this mine was merely a "fire place" with a shallow shaft (possibly eighteen feet deep) and stack about 15 feet high. I ordered the Superintendent to brattice off all air entering the mine by "mud entry," build the stack to a height of 40 or 50 feet, build a new furnace, enlarge all airways to a legal capacity, rebuild all brattices and doors, and clean up entries and air courses.

August 13, 1895, I made my second inspection, and finding no perceptible improvement accomplished, I addressed the following letter to President E. C. Camp:

NASHVILLE, TENN., Aug. 15, 1895.

E. C. Camp, President Coal Creek Coal Co., Knoxville, Tenn.:

DEAR SIR—Until you can provide the legal amount of ventilation in your mines at Coal Creek, I must insist that you do not work over 50 per cent. of the men you had in your mines Aug. 13, 1895, the date of my last inspection. It is my intention to enforce the mining laws of this State, and I shall insist on a strict adherence to the statutes. If you cannot work your mines in accordance to the statutes, we had best make a test case of the law.

I am ready and willing to go to your mines any time you believe they are up to all requirements, and my orders have been carried out.
Very respectfully,

F. P. CLUTE, *Commissioner.*

Air measurements, reported by A. H. Bowling, Superintendent:

Thistle Mine, Oct. 10, 1895: At intake, 7,353 cubic feet; near face of main entry, 3,259 cubic feet; near face of fifth entry, 4,934 cubic feet; near face of fourth entry, 5,177 cubic feet; at furnace, 10,547 cubic feet.

Below I give the ventilating reports for Dececember, 1895, to show the improvement:

Thistle Mine, 61 men and 6 mules, equivalent to 97 men.

1st week—Main entry, near parting (intake), 9,361 cubic feet; crosscut to seventh entry, 5,620 cubic feet; crosscut to sixth entry, 6,018 cubic feet; crosscut to fifth entry, 5,671 cubic feet; crosscut to fourth entry, 6,322 cubic feet; furnace (outlet), 11,591 cubic feet.

2d week, same number of men—Main entry, near parting (inlet), 9,558 cubic feet; crosscut to seventh entry, 5,456 cubic feet; crosscut to sixth entry, 7,550 cubic feet; crosscut to fifth entry, 6,453 cubic feet; crosscut to fourth entry, 7,142 cubic feet; furnace (outlet), 12,617 cubic feet.

3d week, same number of men—Main entry, near parting (inlet), 9,481 cubic feet; crosscut to seventh entry, 5,314 cubic feet; crosscut to sixth entry, 7,097 cubic feet; crosscut to fifth entry, 6,262 cubic feet; crosscut to fourth entry, 6,954 cubic feet; furnace (outlet), 11,533 cubic feet.

4th week, same number of men—Main entry, near parting (inlet), 9,018 cubic feet; crosscut to seventh entry, 4,891 cubic feet; crosscut to sixth entry, 6,872 cubic feet; crosscut to fifth entry, 6,107 cubic feet; crosscut to fourth entry, 6,486 cubic feet; furnace (outlet), 10,979 cubic feet.

Knoxville Iron Company.

Wm. P. Chamberlain, President, Knoxville, Tenn.
T. I. Stevenson, Vice Pres. and Gen. M'g'r., Knoxville, Tenn.
Otis A. Brown, Secretary and Treasurer, Knoxville, Tenn.
W. L. Nelson, Superintendent of Mine, Briceville, Tenn.
H. B. Douglass, Engineer of Mines, Clinton, Tenn.

COAL CREEK MINE.

On entering upon my duties as Mine Inspector I was informed that this mine had been condemned by my predecessor in office, but had continued operations. June 24, 1895, I made a thorough inspection of the mine. At that time there were 99 men employed in the mine, of whom 90 were State convicts.

The ventilation was deficient in every respect; all brattices and doors were old and rotten; the main entry air course was obstructed with slate, slack coal and debris, and but little or no air was in circulation through the head of the main entry; at one point the main entry stumps were crushing, and there was danger of a large amount of coal, if not some lives.

The company used a mine locomotive to haul the coal from inside side-track to tipple, the smoke of which completely destroyed the limited amount of air in circulation. I ordered the main entry properly propped at point where crush was showing, the number of men reduced working at head of main entry, all brattices and doors repaired and the main entry air course cleared of debris, also the furnace repaired, and height of stack to shaft increased.

Report to company:

NASHVILLE, TENN., July 1, 1895.

O. A. Brown, Secretary-Treasurer Knoxville Iron Co., Knoxville, Tenn.:

DEAR SIR—I regret to report the bad condition of No. 1 mine, the property of your company at Coal Creek. The ventilation is very defective at head of main entry, barely sufficient air for the men employed there drawing pillars, and not sufficient to remove the gas produced by locomotive engaged in hauling coal from the mine. I find the trouble caused by the air-course pillars having been robbed and the works gobbed with slack coal, which prevents the air from percolating through the works to the head of the mine. I found the works on right of main entry (near entrance) well supplied with air, and that the furnace was drawing its principal current from this part of the mine, and in order to force more air to head of mine I ordered two-thirds of the air inlet to works on right of main entry to be bratticed off, which should increase the volume of air in head of main entry (if there is any connection for the air to pass to that point), and give sufficient for the part on right of main entry. The drainage entry, which acts in part for air inlet to head of main entry, has an iron grating which obstructs about two-thirds of the area of this inlet. I find that a large part of the air comes from adjacent worked-out and abandoned mines, which is impregnated with black damp, and its presence necessitates a greater amount of air to dilute this gas than otherwise would be required; besides, the locomotive smoke requires a large volume and strong current to remove the dangers from that source. I have ordered the changes required made at once, and in order to know if they will be effective I will visit the mine again this week, and if you desire to be present I will advise you later as to exact time of my visit.

Very respectfully,

F. P. CLUTE,

Commissioner of Labor and Ins. of Mines.

On my second visit I found a great improvement, but did not consider the ventilation sufficient, as I requested the company to stop the use of the locomotive and employ "spiked" mule teams instead. I instructed the warden of the prison to report all complaints from the prisoners in reference to bad air, and am pleased to say that not a single report of that character has been received, and he informed me recently that none had been made to him. The principal work was robbing pillars and stumps. Have made two or three visits to the mine since. I am convinced that the course pursued with this mine has resulted in saving a large amount of coal.

CROSS MOUNTAIN MINES NOS. 1 AND 2.

These mines were idle most of the year. No. 1 was put in operation in September, 1895. I made an official inspection of this mine October 17, 1895, and the following report was made to the company:

NASHVILLE, TENN., October 20, 1895.

Knoxville Iron Company, Knoxville, Tenn.:

GENTLEMEN—I made an official inspection of the Briceville Coal Mines, that are operated by your company.

Please allow me to call your immediate attention to the Acts of 1881, Chapter 170, Section 3, which provides that every mine shall have two (2) outlets or inlets, or means of ingress or egress. In this respect your mine known as No. 1 does not comply with the law, and the section referred to sets out the manner of driving the second outlet, that is, by three shifts. I must insist that you immediately commence the second outlet or inlet, according to the above referred to statute.

All doors and brattices require more or less repairs.

A stack, 25 or 30 feet high, should be built over the top of the shaft.

Your mine boss must make weekly measurements of the ventilating currents, and make monthly reports to this office, as required by Acts of 1881, Chapter 170, Section 8. Blanks for this purpose are herewith enclosed, together with a copy of the State mining laws.

No. 2 Mine—This mine will require a new furnace, and stack over shaft, or some acceptable ventilating appliance, before mining operations are resumed. Please notify this office when you resume operations in No. 2 mine.

The following sections of the Acts of State of Tennessee of 1881, Chapter 170, Sections 6, 7, 13, and Acts of 1893, Chapter 152, Sections 1, 2, 3 and 4, must be closely observed.

Very truly yours, F. P. CLUTE,
Commissioner of Labor and Inspector of Mines.

This company commenced work on second outlet immediately, and made necessary repairs to brattices and doors.

At time of my inspection they had 42 men on coal, 4 drivers, 1 furnace man, 1 air-way man, 2 timber men, 1 trapper, and 4 mules, equivalent to 75 men in the mine; the inlet current was 12,090 cubic feet per minute; the outlet current at shaft 16,500 cubic feet per minute.

The superintendent, W. L. Nelson, informs me that there were some slight indications of gas.

Output, 120 tons per day.

TENNESSEE STATE MINE.

In accordance to Acts of 1893, chapter 78, sections 1 to 17 inclusive, which act is entitled as follows, "An act to provide for the erection of a penitentiary and appurtenances, upon improved and modern plans, in which to keep and maintain State convicts; to provide for the utilization of convict labor therein, and upon farming land, and in a coal mine or mines, and for the purchase of the property necessary for the aforesaid purposes, and to prepare for the abolition of the convict lease system in Tennessee, the Governor appointed Hon. R. J. Morgan, of Shelby County, Hon. D. K. Young, of Anderson County, and Hon. M. H. McDowell, of Franklin County, who, in conjunction with State Geologist J. M. Safford, made a thorough investigation of numerous tracts of coal lands in the State, which resulted in the purchase from the East Tennessee Land Company of nine thousand (9,000) acres in Morgan County, about twenty (20) miles north of Harriman. The property is situated in what is known as the "Brushy Mountain" coal field, a district drained by the tributaries of Emery River, New River, and Poplar Creek.

The Harriman & Northeastern Railway, a road owned and operated by a stock company composed principally of stock and bondholders interested in the East Tennessee Land Company, the promoters of the town of Harriman. The maximum grade of road is about 3 per cent., and the elevation above tide at Petros (P. O. Joynersville), in valley of the Crooked Fork of Emery River, near boundary of the State's property, is about 1,350 feet.

The mine is opened in a small cove between Indian Knob and Frozen Head Mountains. These mountains have an elevation of nearly 2,000 feet above the railroad.

The coal measures lie approximately horizontal. The seams have a slight dip to the eastward, probably about ten (10) feet to the mile.

There are said to be eleven (11) workable veins above drainage on the State's property. The coal measures in this section of the State are far more important than those to the south and west, the total thickness of coal-bearing strata being about 3,000 feet, and containing about thirty (30) separate seams.

Work was commenced on grading for the mine yard in August, 1894, with free labor; work on the main entry was begun Nov. 1, 1894, with convicts hired from the lessees, under direction of Louis E. Bryant, engineer of mines.

July 1, 1895, Hon. W. M. Nixon, of Hamilton County, was appointed in place of Hon. D. K. Young, resigned, and Hon. S. R. Simpson, of Sumner County, was appointed in place of Hon. M. H. McDowell, resigned.

August 1, 1895, Louis E. Bryant, engineer of mines, resigned, and J. T. Hill was appointed as manager of the mines. Mr. Hill says in his report, dated Jan. 1, 1896: "As yet only one mine has been developed, which is opened in the "Brushy Mountain Seam," a coal new to the trade, but of excellent quality as a steam and coking coal. Its analysis is as follows:

Fixed carbon	62.31
Volatile matter	32.32
Ash	4.56
Sulphur	.81
	100.00

A considerable quantity of the coal has been coked, and used with good results at Rockwood and Dayton, but the only analysis we have is the one made at Rockwood, June 18, 1895, of coke made from unwashed slack coal at a small battery of ovens at Harriman, as follows:

Fixed carbon	86.35
Ash	11.68
Sulphur	1.97
	100.00

The analysis is remarkable, under the circumstances, and in its result shows a superiority in every respect over any of the prominent coking coals of Tennessee and Alabama.

I regret not being able to submit an analysis of coke made from run of mines, or washed coal, as either would show a much better result.

There is no question, however, as to its practical utility in the furnace, as it has had practical test in that regard. The opening we are now working has developed to about one thousand (1,000) tons capacity per day. The measurements on Dec. 31, 1895, show:

Main entry	1,688 feet.
Total cross entries	8,601 feet.
Total rooms turned	206

The mine is laid out and worked on the double entry system, and the main entry is double-tracked with 30-lb. rails. The coal seam is situated at an elevation of one hundred and fifty-eight (158) feet above the railroad, necessitating the use of an incline about 500 feet in length. But for this fact our capacity would be double what it is at present. The mine is self-draining, and is ventilated by one fifteen (15) foot Crawford & McCrimmon steel fan. The outside improvements consist of railroad tracks, scales tipples, office, barn, etc.

A number of dwelling houses are yet to be built, as well as coke ovens.

The most important of all improvements, and the one requiring the greatest care and thought, is the prison. The main building is about completed, and is occupied by five hundred convicts. The building forms two sides, or wings, of a hollow square, the front elevation being two hundred and five (205) feet long, thirty-one feet wide, and four (4) stories high. The lower floor of the front wing is used as a dining room, while the lower floor of the side wing is utilized as a bath-room, equipped with shower and plunge baths. The remaining five stories are occupied as sleeping quarters, each ward accommodating from one hundred to one hundred and twenty prisoners.

The swinging bunk system, the same as now in use at Coalburg, Ala., has been adopted as best for health and cleanliness, as well as for convenience and safety in guarding.

All prisoners, on quitting work, are required each day to enter prison by way of bath-room, remove their working clothes, take a bath, and put on a "cell" suit to be worn while in the wards. The hospital, kitchen, guards' quarters, warden's office, etc., are all within the prison enclosure, all of which, as well as the prison proper, are equipped with a view of convenience, economy, and in keeping with modern thought and progress.

In all work performed and to be done, the first consideration has been the health and discipline of the convicts.

The property is a valuable one, and could be sold at an advance over the cost to the State.

May 25, 1895, I had an analysis made of the "mother of coal," which forms thin partings in the vein, which was as follows:

Moisture	0.296
Volatile matter	8.800
Ash	3.572
Carbon	87.332
Sulphur	0.200

This analysis was made by Wm. M. Bowron, South Pittsburg, Tenn., and from same chemist I give analysis of the coal:

Moisture	1.13
Volatile matter	36.77
Coke	62.10
Ash	5.46
Carbon	56.64
Sulphur	1.92

First inspection was made May 22, 1895. David Eller, mine boss. All work consisted of entry and air-course work. No rooms were being turned.

Main entry was 700 feet long; first left-hand entry, 330 feet; first right-hand entry, 170 feet; second left hand entry, 240 feet; second right-hand entry, 160 feet; third left-hand entry, 125 feet; third right-hand entry, 150 feet.

Air-ways well up to faces.

Ventilation supplied by a small furnace.

I entered a protest against the carelessness displayed in keeping powder, dynamite, dynamite caps and fuse in a small house at mouth of mines that was also used for general tool house.

Railroad track at chute, 1,454 feet above tide water.

Mine opening is 1,616.63 feet above tide water; 500 feet from entrance, 1,617.32 feet; at 800 feet, 1,619.17 feet; at 1,300 feet, 1,623.40 feet; at 1,456 feet, 1,627.06 feet. Nine hundred feet above this vein the three Pioneer veins are found, 30 to 50 feet apart; in thickness from 30 to 50 inches.

December 20, 1895, I made my second inspection (J. T. Stith, mine boss). The ventilation was not what it should have been, but by accident, the night previous, the stack had been partially destroyed by fire. A fan was being erected that will insure ample air current for all the men that can be worked in the mines.

Great care is exercised to keep the mine safe in every particular. The vein now being worked is really the "Jellico vein," but the structure of the coal, partings and top are different. So far as developed the vein is very regular; coal averages about 42 inches thick.

The Dean coal lies about 600 feet above the one being worked. It is about 50 inches thick, including several bands of slate and dirt. Over the whole property it is said to range from 40 inches to 12 feet in thickness. It is a bright, black coal, high in ash and low in sulphur. It mines in large, firm lumps, and will stand competition with other steam and domestic coals, if properly mined and cleaned.

Analysis of Dean coal:

Sulphur	0.09
Volatile matter	33.29
Carbon	58.76
Ash	7.13

Nothing is being done at present toward opening this vein.

The following analysis has been furnished the Bureau since Mr. Hill made his report. They were made by the Roane Iron Company, at Rockwood (in December), of the Brushy Mountain slack coal containing mine dirt:

	Moisture.	Fixed Carbon.	Sulphur.	Ash.
Unwashed slack coal	36.19	51.10	2.42	12.71
Washed slack coal	37.74	54.50	1.79	7.76
Washed slack coal	37.57	54.01	1.83	8.42
Coke from washed slack coal	2.97	84.54	1.41	12.49

The seam being worked underlies about eight thousand acres of the State's land, presenting a pleasing uniformity of quality and thickness in the mines and various test openings made. There is one band of dirt or slate parting in the seam, which is found near the bottom. This parting varies from one to four inches in thickness, and is soft enough to be easily mined with the pick. The coal bench below is from two to six inches thick. The coal is a lustrous black in color, and breaks cuboidal lumps, firm, and no tendency to air slack; cleavage planes are distinct, with a general direction of about north 70 degrees west. The main entry should have been opened on this line of cleavage, so that all work would have been parallel with the "butts" and "faces. The main entry should be changed to the line of cleavage, and all "butt" entries driven at right angles with the main entry.

ROANE IRON COMPANY, Rockwood, Roane County.

(Rockwood Colliery.)

H. S. Chamberlain, President, Chattanooga, Tenn.
Frank Neiland, Treasurer, Chattanooga, Tenn.
O. L. Hurlbert, Secretary, Chattanooga, Tenn.
Willard Warner, Jr., General Manager, Rockwood, Tenn.
Wm. Richards, Superintendent Mines, Rockwood, Tenn.
Wm. F. Millican, Mine Boss (old mine), Rockwood, Tenn.
Geo. Barnett, Mine Boss (Nelson slope), Rockwood, Tenn.
M. V. Pierce, Fire Boss (old mine), Rockwood, Tenn.
F. H. Clymer, Mining Engineer, Rockwood, Tenn.

Mine inspected August 3, 4 and 5, 1895.

Report of inspection to the General Manager:

NASHVILLE, TENN., Aug. 10, 1895.

Willard Warner, Jr., General Manager Roane Iron Company,
Rockwood, Tenn.:

DEAR SIR—In reference to my recent inspection of the Roane Iron Company's mines, at Rockwood, Roane County, Tenn., I am pleased to report that the general conditions of the old mines are above the average; but there are a few facts that I desire to call your attention to, and trust you will give them your immediate attention.

The brattices between the main intake air-way and the return air-way, or "haulage slope," that are constructed of wood, require rebuilding, and I suggest that they be constructed of brick-work or masonry, owing to expense and difficulty to maintain wooden brattices with the heavy air pressure from your fan. Many of the doors require readjustment, so they will readily close tight. You should provide brattice cloth to use around edges and bottoms of doors, to prevent the leakage of air, which I find is the principal trouble with your ventilation.

The intake air current in old mines measured 38,000 cubic feet per minute, while the same current on the sixth entry measured 11,655 cubic feet per minute.

Many of your rooms, haulways and entries require cleaning up and draining, so that the men may not be compelled to wade in water and mud when going to and from their working places.

I was pleased to find that you had provided a man-way to protect your men from the dangers incident to walking in and out of the mine on the haulage slope. But few of the mines in the State have this important entry, and I trust your men will appreciate and use this protection provided for them.

I believe it to be of interest to your company and better protection to your men, to employ an experienced miner, who shall have no other duties than those required in the capacity of "fire boss" in the old mines; have him enter the mines not later than 2 o'clock a. m., each day, and examine every working place not on main air current for presence of gas; also, see that the doors are properly closed, and that all doors and brattices are in proper condition; also, assist the miners in fanning their working places where gas is found in them, and report to the superintendent of mines every place where he finds gas. I know you have this done by your mine boss, but it seems to me that his (mine boss') whole time should be given to looking after the protection of miners in their rooms, and the general inside work incident to that position.

I desire to call your attention to chapter 170, Acts of 1881, sections 1 and 2, in reference to maps of mines; also section 7 as to dimensions of airways, and section 8 as to reports of measurements of ventilating currents. In reference to section 13, concerning reports of boilers, I will accept an affidavit from your boiler man as to their condition, provided he will subject them to a test 25 per cent. higher than the steam pressure carried, giving description of each boiler, when and by whom made, and all particulars concerning their condition. I do this for the reason that we have no such Board of Examiners as provided for in this act; but later will take legal advice on this matter and report to you whether it is legal for me to accept report of such an examination.

DRIFT SLOPE MINE.

This is a small mine opened to rob some "pillars and stumps" between the old mines and Nelson slope; natural ventilation; only 6 men employed in the work.

Have your inside men watch the safety of the men employed in this mine closely, especially the propping.

Keep the water from roadways to prevent the men from having to wade water going to and from their working places.

The same report of boiler inspection as at old mines will be accepted in case of boiler at this mine.

NELSON SLOPE MINE.

The ventilation in part of this mine is very imperfect, due partially to the "black damp" drawn from old works, but mostly from the radiation from steam pipes leading to, and exhaust from steam pumps in the mines.

I find that part of the trouble is caused by insufficient boiler power to operate the fan and haulage engine properly.

Your steam pressure is reduced from 100 pounds to 60 pounds, while hauling up loaded trip from mines and empties from chute, which retards the revolution of steam pressure, and cuts off the proper air current. You should provide more boiler power and operate the mine pumps by compressed air.

Have all brattices and doors repaired and conduct the air to all working places.

I shall insist on your immediate attention to this work at Nelson slope, for the ventilation must be improved; the entries must be drained better and all mud removed from same.

All boilers at this mine will come under same orders as those at "Old Mines."

Having worked in these mines, I am fully acquainted with the difficulty and expense attached to properly ventilate the rooms in the coal "pockets," and herein desire to compliment you on the close attention, energy, and competency of your subordinates in charge of this work. I hope to have an opportunity to make another examination of Nelson Slope in the future, when I trust you will have ventilation improved, and entries cleaned of water, mud and slate.

At tipple they have a "crusher" in the chute. I ordered bars put across to prevent any person, who should by accident fall into the chute, from being killed by the rolls of crusher. Please put in the bars at tipple above the crusher at your earliest convenience.

Received report of accident to Dan McPherson, who was burned by a fire-damp explosion Aug. 7, 1895, and will investigate it at an early date.

Thanking you for copy of contract with miners and map of mines,
I am, Very truly yours,

F. P. CLUTE,
Commissioner of Labor and Inspector of Mines.

At time of inspection, W. L. Nelson, Esq., was superintendent of mines.

The average slope of vein in the old mine is about 22 feet to the hundred feet.

Pressure fan, 20 feet in diameter; average speed, 75 revolutions per minute.

Head of main entry is 452 feet below tunnel; elevation of tunnel, about 1,000 feet above sea level; length of main entry and tunnel, about 4,200 feet; length of Nelson slope main entry, about 1,600 feet.

At time of inspection there were employed in the old mine, 104 men and 17 mules; in Nelson slope, 84 men and 13 mules.

The air inlet of Nelson slope measured 14,625 cubic feet per minute; the outlet (about) 32,000 cubic feet per minute; 10-foot exhaust fan, 120 revolutions per minute. Since the inspection the fan has been reversed, which gives a larger volume of air, and the pressure tends to keep the black-damp back in old works.

Since Sept. 1, 1895, the company has made reports of weekly measurements of ventilation promptly.

On Nov. 2, 1895, the company completed connections for running all their inside pumps with compressed air, thereby avoiding the dangers incident to use of steam pipes in the mines; also, completed the necessary work for splitting the air on No. 2 entry in old mines.

ACCIDENTS.

Aug. 7, 1895, Daniel McPherson, a miner, married, was burned by a fire-damp explosion while working in his crosscut, 30 feet from entry No. 6, in old mines. He was burned on hands, and forearms, and face, but not deeply or dangerous. The Bureau was notified promptly.

Aug. 28, 1895, Willie Richards, aged 17, had a slight injury on back; no bones broken; had worked in the mines three years; he was riding up the slope in old mines.

Oct. 1, 1895, Bud Simpson, miner, had his arm dislocated at shoulder, trying to catch on to a trip at drift switch (outside), for purpose of getting a ride. Geo. Day, Pete Hickey and —— Skidmore were present.

Oct. 17, 1895, Tom Wormsley, miner, married; a piece of slate fell from top and hit him on the head, bruising it quite badly.

Oct. 17, 1895, William Brymer, a miner, was instantly killed by a fall of coal. He was at work in his room with Joe King; they had worked together about 17 months. Joe King was the only person present at time of accident. Jim Sperlin and Ab Melson went into the room just after accident. The bottom had gone down, and they had worked room for about 9 feet with top coal, when bottom came up again, and the top coal had to be taken down. Mine Boss Millican so instructed them the morning of the day of accident. They were preparing to take it down, and had a hole in for that purpose.

Brymer, with props on each side of him, was loading coal just under where top of coal began, when about 500 pounds of top coal fell, part of it on him, killing him instantly. King was working about four feet in front of him, and none of the coal touched him.

W. J. Richards, mine superintendent, says that Wm. Brymer was killed by a fall of coal in his room obout 3 o'clock, and the coal that struck him fell from the top, and would weigh about 500 pounds; propped on right under slate top within two feet of where he was working, and one on left under the coal, within five feet of where he was working; seven feet between prop and prop, and within six face of room; width of place, 12 feet; height, 9 feet. There was a slip where the coal fell from. Joe King was working with him when Brymer was killed, and Ab Melton and Jim Spurlin helped get him out. W. F. Millican, inside boss, was in the room about 12:30 o'clock of above date.

The analyses of the coal is as follows:

Washed coal—	
Fixed carbon	58.23
Volatile matter	32.86
Ash	8.91
Unwashed coal—	
Fixed carbon	52.09
Volatile matter	32.32
Ash	15.59

Analyses of coke made from the above:

From washed coal—	
Carbon	83.31 (?)
Moisture	3.02
Ash	13.67
From unwashed coal—	
Carbon	84.66
Sulphur	0.32
Ash	15.34

Old mine generates some fire-damp. A recent letter from the superintendent informs me that he has put in some sprinklers to allay the dust, to prevent danger of explosions from that source.

BLACK DIAMOND MUTUAL BENEFIT ASSOCIATION.

The employes of the Roane Iron Company, at Rockwood, have organized a benefit insurance among themselves, and believing it may be of interest to miners at other mines, I give the by-laws, etc. Any information desired by miners at other mines in the State can be had by addressing the Secretary and Treasurer. A similar organization has been organized at the Black Diamond Mines at Coal Creek. At Rockwood the assessments are 50 cents per month, and membership from 190 to 200:

BY-LAWS
OF THE
BLACK DIAMOND MUTMAL BENEFIT ASSOCIATION,
OF ROCKWOOD, TENN.

GEO. W. BARNETT, President.	N. DALE, Vice-Pres't.	WM. RICHARDS, Sec'y-Treas.

BOARD OF DIRECTORS.

GEO. BARNETT, N. DALE, FRANK KINDRICK, J. B. HUNNICUT,
SAM HOWARD, H. RICHARDS, C. M. ODELL.

ORGANIZED OCTOBER 20, 1894.

BY-LAWS.

Be it resolved, That we, the employes of the Roane Iron Company's coal mines, establish and maintain a sick benefit fund, to be known as the Black Diamond Mutual Benefit Association, of Rockwood, Tennessee.

ARTICLE I.

SECTION 1. The membership of this association shall consist of all such employes working in or around the aforesaid mines that wish to pay the dues hereafter stated, and be governed by its laws, rules and regulations.

SEC. 2. This Association shall have the following officers, viz.: President, Vice-President, Secretary and Treasurer, and a board of seven Directors.

SEC. 3. The duty of the President is to preside over all meetings, appoint all such committees as the welfare of the association may require, approve or reject all benefit claims, be chief executive of the association, and upon the death, removal or resignation of any subordinate officer, shall appoint a successor, and be one of the seven directors.

SEC. 4. The duty of the Secretary and Treasurer is to keep the minutes of all meetings, collect all dues, pay all benefit claims, and keep a record of all business of the association.

SEC. 5. The duty of the Board of Directors is to settle all disputes in benefit claims, audit the books of the Secretary and Treasurer at least once a year, and report the financial condition of the Treasury to the association, and be committee on laws.

SEC. 6. The duty of the Vice-President is to assume the duties of the President upon the absence, removal or resignation of the President, and be one of the seven directors.

ARTICLE II.

SECTION 1. The Secretary and Treasurer must give a bond of one thousand dollars for the faithful keeping of the funds of the association.

SEC. 2. The bond of the Secretary and Treasurer must be attested before a Notary Public, and be approved by the Board of Directors.

SEC. 3. The Secretary and Treasurer shall not turn over any money nor records of the association to his successor until said successor has complied with the above sections of this article.

SEC. 4. The officers of this association shall be elected annually, on the nearest Saturday to the 20th day of October in each year.

ARTICLE III.

SECTION 1. Each and every member of this association shall pay the sum of fifty cents per month as dues, for the maintenance of a sick benefit fund.

SEC. 2. The association will pay $4.00 per week benefit for every week any member is sick, after the member has been sick one week.

SEC. 3. Any member desiring a sick benefit must have a certificate from a regular practicing physician, certifying the following: Giving date of first treatment, cause of disability, and that he has seen the patient once a week from first treatment, and pronounces the patient unable to perform manual labor.

SEC. 4. After a claim has been properly certified, as set forth in section 3 of this article, and presented to the Secretary and Treasurer, he shall, on approval of the President, pay the same immediately.

SEC. 5. If the President, for any reason, should think the claim an imposition, he shall refer it to the Board of Directors, and if their decision is not satisfactory to the claimant, he may appeal to a meeting of the members, and the voice of the majority of those present shall be final.

SEC. 6. If the proof is established by reputable persons that a member has been doing any work at home, or elsewhere, while claiming benefits, or habitually loafing at saloons, the Board of Directors shall declare the claim and physician's certificate null and void.

SEC. 7. This association will pay the surviving family of a deceased member $30.00 to defray burial expenses of a member.

SEC. 8. Should the dues exceed the benefits, the Board of Directors may reduce the rate not less than 25 cents per month; and should the dues not be sufficient to meet all claims, the board shall, upon advice of the Secretary and Treasurer, increase the rate not more than one dollar per month.

SEC. 9. It shall be the duty of all members to report all imposition to the President, or Secretary and Treasurer, as soon as possible.

Sec. 10. When a claim is referred to the Board of Directors, the director residing nearest to the claimant must take the evidence of the neighbors in claimant's immediate neighborhood, and report same to the meeting of the board, to be acted on accordingly.

Article IV.

Section 1. Should any one working in or around the mines of the aforesaid company refuse to be a member of this association and comply with all laws now in force, and laws hereafter enacted for its government, will have to look elsewhere for help should he need it.

Sec. 2. Any member carrying a subscription paper around the aforesaid works for such a case as defined in section 1, article 4, shall be fined by the President not less than $2.00 or more than $5.00, to be collected through the office, and for the third offense he forfeits his membership.

Sec. 3. No one will be allowed to carry a paper for any purpose on the aforesaid works without the endorsement of the Board of Directors.

Sec. 4. The dues and fines of all members will be charged in the company's office the first day of each month; laborer's dues will be charged to the miner he works with, and the Secretary and Treasurer will collect the dues on pay day of each month.

Sec. 5. All new members will be charged $1.00 for the first month's dues, and will be eligible to benefits from date of entry.

Sec. 6. No member is eligible to benefit for any month he has not paid dues.

Sec. 7. The incidental expenses of this association shall not exceed $50.00 per annum.

Sec. 8. No member shall be entitled to benefits where sickness or disability has originated from his own vicious habits, or for any injury sustained by loafing at saloons or other places of immoral repute.

Article V.

Section 1. Should any one become a member of this association by working in the aforesaid mines, and later works in other mines, or ceases to work in or around the mines of the Roane Iron Company, shall still be entitled to membership, so long as said member pays his dues monthly.

SEC. 2. Any member, such as defined in the above section, before claiming benefits, must present a sworn statement from a regular practicing physician, stating his disability and time of treatment.

Adopted by vote of the association, October 24, 1895.

Approved October 24, 1895.

GEO. BARNETT,
N. DALE,
H. RICHARDS,
SAM. HOWARD,
J. B. HUNNICUTT,
C. M. ODELL,
FRANK KINDRICK,
Committee on Laws.

...., 189...

To the Black Diamond Mutual Benefit Association:

I hereby certify that..has been under my treatment since...........................,189..., on account of...,and I pronounce him unable to perform manual labor since first treatment, and to the best of my knowledge and belief said disability did not originate from intemperance or vicious conduct.

...., M. D.

ROCKWOOD, TENN.,.........................., 189...

To................................., *Treasurer Black Diamond Mutual Benefit Association, of Rockwood, Tenn.:*

Pay to order of...

..................................Dollars.
100

...., *President.*

Received payment, ...

DAYTON COAL AND IRON CO., LIMITED.

W. J. Isaacson, Managing Director, Cincinnati, O.
V. Ferguson, General Superintendent, Dayton, Tenn.
W. K. Gibson, E. M., Mine Superintendent, Dayton, Tenn.
J. M. Head, Mine Boss, Dayton, Tenn.
A. J. Holden, Assistant Mine Boss, Dayton, Tenn.

NELSON MINE.

This mine was opened in 1885; it is located in the Walden's Ridge, about one mile south of Richland Creek Gulch, and about two and one-half miles west of Dayton, Rhea County, Tenn. It is a slope mine, in a badly disturbed and broken vein; the coal is from a few inches to seven or eight feet in thickness. The slope is not regular; in some places the vein is vertical, and in places it is quite flat; 45 degree slope is steepest grade on the rope haulways. The elevation of main entrance above sea level is 982.29 feet; elevation of lowest point in mine, 514.53 feet; elevation at junction of entries K and L, 599.91 feet; elevation of railroad tracks at Dayton depot, 704.74 feet.

The problems met with in the successful management of this mine are as difficult as can be found in any coal mine.

The mine has generated considerable quantities of fire-damp (CH_4) ever since it was first opened, and several small explosions have occurred at diffierent times.

In Richland Creek, where it passes through Walden's Ridge, the gas bubbles up in the waters of the creek and can be ignited at any time the water of the creek is at its ordinary stage, showing that the strata of rock covering this mine is thoroughly impregnated with marsh gas. The management is intelligent and competent in every respect, and I am thoroughly convinced that they guard against accidents of every character, but a number of serious accidents have occurred, despite their efforts.

ACCIDENTS IN 1895.

George McMillan, miner, aged 40, American, married, and seven children. He was making a room off No. 3 incline, west side, at a point where the bottom had been shot up sometime previous in order to make the grade more even; at time of accident (9:30 p. m.), he was about to jump up on the bench, on which one of his men, John Cooper (col.), was at work, when some coal fell from the top, striking him on the head, left arm and hand, inflicting injuries from which he died eight hours later. A shot had been fired a short time before accident occurred, but Cooper examined coal and found everything safe before he resumed work.

The following was the verdict of coroner's jury, held by Coroner S. H. Pearcy, at Dayton, Rhea County, Tenn.:

The jurors whose names are hereto affixed, upon their oaths, do say that they find the name of the deceased to be G. W. McMillan, a white man, about 40 years of age, and that he came to his death on the 2d day of April, 1895, at 5 o'clock a. m., by being struck by falling coal, in Nelson Mine, Rhea County, Tenn.; said accident occurring on April 1, 1895, at 9 o'clock p. m.

[Signed]
R. C. KNIGHT, Foreman,
J. J. HOGE,
S. L. UMBARGER,
J. D. MORGAN,
ROBT. AXMAKER,
J. D. BELL,
J. W. BRITT.

May 8, 1895.—James M. Head, Mine Boss, was burned by fire-damp, about 11:40 a. m., in room No. 1, left of entry C. He had gone in room for purpose of knocking to some workmen in an adjoining room, in order to ascertain the thickness of pillar between rooms; he had barely reached the "face" when his naked lamp ignited some fire-damp that had collected overhead and caused an explosion, burning him about his head, face and hands. He recovered, but is badly scarred.

Marion Green and George Henderson were burned by an explosion of fire-damp, about 11 o'clock p. m., Octtober 16. Green was driving a crosscut on the left, and to the rise of entry P 1; some gas being given off in the "face," a hand fan was employed forcing air thereto in order to keep it clear of gas, until connection was made with the air-course, and Henderson was put in charge of it.

On the night in question Green had "tamped" his "holes" ready for "shooting," and then joined Henderson on the entry, and both retired a short distance and sat down to rest; sometime afterwards the "fire boss" was heard approaching on his rounds of inspection, and without allowing a sufficient time for Henderson to clear the gas, Green rushed up to fire the shots, with his naked light in his hand, the result being an explosion. Green was burned about the face, chest, abdomen, arms and hands; the physician classified his burns as those of the second degree. Henderson was burned slightly about the ears. The fire-boss, A. J. Holden, was between the two men at the time and escaped by lying down. Five minutes blowing was sufficient to remove every trace of fire-damp, the current on entry being very good.

Nov. 25, 1895.—John Gurgauns was injured by a fall of top coal, in a room on east side of entry K, which he had failed to guard against by propping or taking down. At the time he was under the coal getting out some tools. He was not seriously injured.

Dec. 7, 1895.—Mose Holman (col.) was attempting to drill out a piece of dynamite in a "hole" that had "missed fire." He got off very light for his carelessness, as he was merely knocked several feet and his fore-arms slightly burned. This occurred in District 10 off entry K.

Dec. 20, 1895.—Between 7:15 and 7:30 a. m. occurred the worst explosion in the history of coal mining in this State. The depositions hereto attached really cover all that occurred of any importance.

I was notified promptly of the explosion, and arrived there at 7:20 a.m., Dec. 21. A most thorough investigation and study of the situation convinces me that the principal agency of this explosion was *coal dust.*

Every part of district was carefully examined for evidence to locate the origin of the explosion; the direction of force was readily traced in every direction from side track at junction of entries K and L, and near side track in room No. 2 (Josh Bennett's), on K entry; it was self-evident that a gas explosion had occurred in that room.

The fire-boss had found a small quantity of gas while on his morning rounds examining the working places, and marked out that room in customary manner, afterwards making it the subject of a report to J. M. Head, mine boss. (See J. M. Head's and S. L. Umbarger's depositions.)

I am fully convinced that Mr. Umbarger did his duty, and is a thoroughly competent man to act as fire-boss.

The side track at junction of entries L and K is a point where it would be impossible for a large volume of gas to collect, it being in a "swag" with higher ground on either side, and on the main airway of that district (see map); the air enters this district by entry K from Dixon slope, where it is "split"; part of current is used to ventilate the works between entry G and K, and afterwards conducted to side track at junction of entries K and L; the other part is used to ventilate the works on north side of entry K, passing up No. 8 room to P 2 (a point about 100 feet higher than the side track above referred to), thence through the works of P 2, Nos. 8 and 7 rooms, P 1, and by No. 7 room to entry K, thence along entry K to No. 3 room, up that room to third "dog-hole," through said "dog-hole" to room No. 2 at a point within 20 feet of face of said room (the point of origin of explosion), down to entry K and then to side track, where in conjunction with volume of air from south side of entry K another split occurs, the larger part being conducted by the return airway to the exhaust fan, the current not being used to ventilate other working places; the balance of current is conducted from latter split to main entry U, where it mingles with the fresh air received through main entry U, which in turn is used to ventilate districts Nos. 1, 2 and 3 by a similar system. In room No. 2 on entry K the timbers were scorched and the coal on "ribs" was slightly coked, showing plainly that there had been a fire-damp explosion in that room; also in adjoining room opposite "dog-hole" the props were scorched on side towards room No. 2.

My opinion is that this was the origin of the explosion, and this opinion is strengthened by the evidence of the miners working in the mines, as well as the mine officials, together with the direction of the force of the explosion throughout the entire district.

The explosion of this small quantity of fire-damp probably agitated the fine coal dust lying on floor, timbers, sides and everywhere present in this dry mine, which was ignited while in suspension, and a series of intermittent subsiduary explosions followed, carrying death and destruction to the inmates of that district, and in one instance to adjacent (No. 9) district, in case of Thomas Hawkins, who was evidently stunned by being blown against side of entry, and while in that condition was overcome with the after-damp from the explosion. He had a bad cut on back of head that might have caused death.

At time of explosion two young men were close to Hawkins, and the force of air blew them beyond Hawkins, both escaping; but one of them, Oscar Hawkins, was burned about the hands and face, the outer skin only being burned; evidently this was caused by the hot air, not by fire. These men were on entry D in district No. 9.

The greatest force of the explosion was exerted against the intake airway, although the force in other directions was terrific, destroying all brattices and doors, knocking down props, slate, coal, etc. On entry K, from side track eastwardly, the falls caused by the explosion were numerous and heavy; some of these falls were caused by timbering having been blown down from under heavy slate that requires timber to support it. Nine victims of the explosion and five mules were found at and near the side track at junction of entries K and L.

The destruction of the doors and brattices by the explosion caused the ventilating currents to take the most direct route to the exhaust fan, consequently cut off all air supply to Nos. 7 and 8 rooms, P 1 entry and P 2 entry, which filled with inflammable gas and imprisoned six victims of the explosion.

The second day after the explosion the volume of this accumulation of gas was estimated at 300,000 cubic feet; that this gas was at its highest explosive point was self-evident from the heavy report caused by its explosion in the test lamps.

Seven days after the explosion four of the above mentioned six victims were reached and removed, and fifteen days afterward the remaining two were removed from P 1, at the overcast on that entry; none of these six were burned by fire, but died from the effects of afterdamp. J. A. Ivester, one of the above six, was found with his head mashed flat, and a large rock weighing about

200 pounds, lying on his head. The work attending the rescue of the victims was extremely hazardous, but was conducted continuously by three shifts of eight hours each—six to ten men on each shift. The brave manner in which these men went at this dangerous work will long be remembered by myself, and especially by the friends of the entombed victims. I refer to W. K. Gibson, Mine Superintendent, V. Ferguson, General Superintendent, J. M. Head, Mine Boss, W. T. Head, Andrew J. Holden, J. D. Stansbury, Geo. W. Gibson, P. F. Lynch, Wm. McNelis, John O. Thurman, W. B. Walker, S. L. Umbarger, John D. Hughes, John W. Rose, and several others that I cannot call by name.

All the victims found at side-track were more or less burned or mutilated; the others were evidently suffocated by afterdamp; several were found lying on their faces, showing the attitude they had assumed in their efforts to escape the intense heat of the afterdamp. The mules killed in districts Nos. 1 and 2 were suffocated by afterdamp.

Charred coal dust, partially coked, was found in different parts of the district deposited on coal, slate and timbers. This strengthens my theory of the explosion, for our best authorities say that this deposit of coal dust, partially or wholly coked, is sufficient evidence of a dust explosion, or that dust was the principal agency of the explosion, and the reason that this coked dust is not found over the entire district is due to the presence of slate dust to such an extent as to prevent the formation of the coke.

I placed the Nelson Mine under orders to allow no light in the mines except an examined and locked safety lamp. No matches or smoking material will be allowed in the mine hereafter.

I instructed the management to draw up suitable rules to operate the mine by in the future that are customary where mines are operated by the use of safety lamps exclusively.

Agreeable to my instructions in letter dated Oct. 2, 1894, the company had ordered a new fan; it was in position, and at a trial a few days previous to the explosion the fan failed to work satisfactorily. The makers were notified to send a man to remedy the defects, and his work was about completed at time of explosion. This fan was sold to them under a guarantee to perform a certain duty. I believe the volume the fan was to exhaust was 100,000 cubic feet of air per minute from the mine.

The company, through its officials, has expressed at all times a desire to comply with the mining statutes in every particular. After a thorough and exhaustive investigation I am of the opinion that the explosion was not caused by any neglect on part of the mine officials, but to the contrary, I believe the men in charge of operations have exercised every precaution for the protection of human life therein.

Had the explosion been due entirely to fire-damp, undoubtedly it would have resulted in a disastrous mine fire that would have prevented the rescue of the victims and probably the loss of the mine. If this mine had been ventilated by the continuous current system, undoubtedly the mortality would have been greater. Details of explosion are given in the different deposiuions taken while investigating the cause of the explosion.

Especial attention is invited to the correspondence between the company and myself; also the following analyses of coal dust—some in a charred condition—from the exploded district, and some where no effects of explosion had reached.

Sample of charred coal dust:

Moisture	1.99 per cent.
Volatile combustible matter	17.45 per cent.
Fixed carbon	50.40 per cent.
Ash	30.16 per cent.
Sulphur	1.05 per cent.

This sample was taken Jan. 1, from Nelson Mine, first room off entry P 1, by Mr. Gibson. Analysis begun Jan. 2, finished Jan. 2. This is a sample of charred coal dust, resulting from the explosion at Nelson Mine, Dec. 20, 1895. F. J. FALKENBACH, Chemist.

Sample of coal dust:

Moisture	1.64 per cent.
Volatile combustible matter	29.35 per cent.
Fixed carbon	48.74 per cent.
Ash	20.27 per cent.
Sulphur	1.14 per cent.

This sample was taken Jan. 1, from the Nelson Mine at entry U, opposite entry D, by Mr. Gibson. The sample showed no charring as a result of the explosion Dec. 20, 1895. Analysis finished Jan. 4, 1896. F. J. Falkenbach, Chemist.

Sample of coal dust:

Moisture	1.64 per cent.
Volatile combustible matter	24.55 per cent.
Fixed carbon	43.49 per cent.
Ash	30.32 per cent.
Sulphur	1.07 per cent.

This sample was taken Jan. 3, from Nelson Mine, from entry P 1, opposite second crosscut, by Mr. Gibson. The sample showed no charring as a result of the explosion Dec. 20, 1895. Analysis finished Jan. 6, 1896. F. J. Falkenbach, Chemist.

Sample of coal dust:

Water	3.89 per cent.
Volatile combustible matter	23.80 per cent.
Fixed carbon	45.83 per cent.
Ash	26.48 per cent.
Sulphur	1.31 per cent.

This sample was taken Jan. 4, from Nelson Mine, from 1st room off entry P 1, by Mr. Gibson. The sample showed no charring as a result of the explosion Dec. 20, 1895. Analysis finished Jan. 7, 1896. F. J. Falkenbach, Chemist.

Sample of charred coal dust:

Water	2.14 per cent.
Volatile combustible matter	19.20 per cent.
Fixed carbon	59.94 per cent.
Ash	18.72 per cent.
Sulphur	1.10 per cent.

This sample was taken Jan. 6, off of a prop in room No. 7, about 200 feet above P 2 parting, by Mr. Gibson, in presence of a party inspecting the mine with him, viz: F. P. Clute, Mine Inspector, V. Ferguson, W. T. Head, George Gibson, P. F. Lynch, Brownlow Walker, S. L. Umbarger, and others. The sample was charred into a lump. Analysis finished Jan. 7, 1896.

F. J. Falkenbach, Chemist.

Sample of coal from Nelson Mine:

Water	1.60 per cent.
Volatile combustible matter	32.04 per cent.
Fixed carbon	59.77 per cent.
Ash	6.59 per cent.
Sulphur	1.17 per cent.

This sample was taken Jan. 6, 1896, from Nelson Mine, from No. 7, about 200 feet above P 2 parting, by J. M. Head, Mine Boss. Analysis finished Jan. 8, 1896. F. J. FALKENBACH, Chemist.

These analyses show conclusively the burnt condition of the dust. The mine is extremely dry, and in some localities considerable quantities of dust have accumulated along the haul-ways; sprinkling has been resorted to as a preventative of danger from this source.

The following table of air measurements, compiled from the monthly reports from this mine, will show the volume passing the points indicated above. See measurements under head of station E, on entry K, and station F on E.

NELSON MINES—DAYTON COAL & IRON COMPANY. *Table of Air Measurements, compiled from Monthly Reports to Bureau of Labor, Statistics and Mines, for* 1895.

MONTH.	Week.	Fan Revolutions per minute.	Water Gauge.	STATION A.	STATION C.	STATION E.	STATION F.	STATION G.	STA. G & F.	STATION D.	EMPLOYES.		MULES.	
				Entry U.	Entry E.	Entry K.	Entry E.	Entry F.	Entry R.	Outlet at Fan	Day.	Night	Day.	Night
January,	1	180	0.70	8,740	7,801					28,420	115	21	22	3
	2	174	0.70	12,540	9,715					28,420	125	9	23	3
	3	172	0.68	12,920	8,903					27.608	127	14	23	4
	4	174	0.65	12,274	10,614					25,502	128	19	23	3
February	1	174	0.67	12,654	6,365					26,684	117	17	21	3
	2	174	0.66	12,920	6,365					25,648	136	17	22	3
	3	178	0.70	10,374	5,684	3,966				28.280	120	15	21	2
	4	170	0.66	12,502	5,568	4,113				27,412	117	18	21	2
March	1	170	0.65	12,248	6,293	4,214				26,684	116	17	21	2
	2	174	0.68	12,350	7,482	4,113				25,760	119	17	21	2
	3	170	0.68	9,804	7,743	5,589				24,080	121	20	21	2
	4	174	0.68	10,640	7,946	5,005				25,760	128	21	21	2
April	1	170	0,62	10,374	5,423	5,424				26,600	122	23	21	3
	2	176	0.61	10,944	6,380	5,040				27,160	110	13	20	2
	3	180	0.65	10,792	6,264	5,550				25,816	102	19	20	3
	4	174	0.68	10,640	6,641	5,550				26,264	122	15	20	3
May	1	174	0.68	12,084	5,945	6,165				27,440	123	19	20	3
	2	178	0.75	9,500	6,467	6,975				25,928	123	18	20	2
	3	180	0.70	10,830	5,800	6,240				25,200	126	21	20	3
	4	178	0,70	11,970	6,525	6,240				25,760	117	18	20	2
June	1	174	0.68	11,096	6,728	6,180				24,416	112	17	20	3
	2	178	0.65	11,286	7,967	5,775				26,320	120	18	20	3
	3	188	0.72	11,210	6,960	5,970				25,200	119	18	20	3
	4	176	0.73	10,830	7,685	6,225				26,684	123	16	20	3
July	1	174	0.68	10,792	7,105	5,640				26,040	113	13	20	2
	2	174	0.70	11,248	8,060	5,040				26,040	120	16	20	2
	3	180	0.72	11,248	8,004	5,895				25,648	124	14	20	2
	4	176	0.62	12,464		6,600	4,956	4,040		29,764	114	18	18	4

NELSON MINES—DAYTON COAL & IRON COMPANY—*Continued.*

MONTH.	Week.	Fan Revolutions per minute.	Water Gauge.	STATION A.	STATION C.	STATION E.	STATION F.	STATION G.	STA. G & F.	STATION D.	EMPLOYES.		MULES.	
				Entry U.	Entry E.	Entry K.	Entry E.	Entry F.	Entry R.	Outlet at Fan	Day.	Night	Day.	Night
August	1	176	0.62	12,540	....	....	4,890	....	9,935	33,740	118	22	18	5
	2	180	0.67	13,604	....	....	6,450	....	9,854	31,836	112	19	23	2
	3	180	0.68	11,094	....	....	5,160	....	8,484	30,520	115	17	20	2
	4	180	0.68	12,616	....	....	5,130	....	10,796	32,144	123	21	20	3
September	1	176	0.62	12,958	....	....	4,965	....	9,968	34,020	117	23	20	3
	2	182	0.68	13,680	....	....	6,270	....	10,859	34,160	123	16	16	3
	3	190	0.72	13,946	....	....	5,565	....	10,948	34,804	110	18	18	3
	4	186	0.68	12,996	....	....	5,110	....	11,271	35,000	113	27	18	4
October	1	164	0.47	10,640	....	....	5,400	....	7,860	30,352	102	19	18	4
	2	184	0.63	13,338	....	....	7,350	....	6,858	34,860	107	13	19	3
	3	186	0.65	12,730	....	....	6,750	....	7,398	34,888	114	15	19	4
	4	180	0.55	14,250	....	....	6,090	....	7,913	35,056	103	14	19	4
November	1	188	0.68	14,250	....	7,365	....	....	7,909	34,496	109	14	19	3
	2	190	0.72	14,592	....	7,125	....	....	8,014	35,028	116	16	19	4
	3	188	0.65	11,894	....	7,425	....	....	7,691	33,880	122	18	19	4
	4	x	x	13,908	....	7,275	....	....	6,957	34,944	123	18	19	4
December	1	180	0.78	12,578	....	8,450	....	....	6,837	34,580	113	16	19	5
	2	192	0.87	13,680	....	8,385	....	....	6,652	34,552	117	14	19	3
	3	184	0.75	12,692	....	6,080	....	....	6,566	34,664	111	12	19	3
	4	180	0.72	15,504	....	4,072	....	....	6,532	34,580	121	14	19	3

NOTE—Station E, Entry K (and F on E) is inlet from "Dixon Slope." This ventilates District No. 10.

NASHVILLE, TENN., Oct. 2, 1895.

Mr. George Jamme, General Manager Dayton Coal and Iron Company, Dayton, Tenn.:

DEAR SIR—I herewith submit report of my recent official inspections of the coal mines owned and operated by the Dayton Coal Company, at Dayton, Tenn.

First: Nelson Mine—Considering the difficulty of operating a mine in a vein of this character and position, I find the workings in this mine in a very fair condition, and regret to have found several rooms that miners had neglected to prop properly, and as they had been ordered to do so before my visit by the mining boss. In several places where roadways or haulways have had to be made through old rooms, many of the props used are too small, so, hereafter, in such timbering, employ good, substantial props, and where pillars are weak or workings are wide, I would advise the use of well-constructed cribs, properly erected, filled and keyed to top.

Some provisions should be made for a mode of ingress or egress independent of the rope haulways, and then stop all walking along such entries; but this is a matter that I will leave with your engineer for a solution.

It is my policy to look to the safety of the miners in every respect, and in that work I am assured of the co-operation of your company.

The ventilation of your mine is a difficult problem, but it is self-evident that the mine has outgrown the power and capacity of your ventilating fan.

Therefore, I must insist on your company putting in a larger ventilating fan, or another fan of suitable size, if you desire to use two.

The statutes require that each man in the mine must be supplied with at least 66 cubic feet of air per minute, but in your mine, with a large amount of gas liberated in the workings, the friction the air is subjected to in the air-ways, and the large number of splits required, owing to the irregular workings, demands a greater amount of air to each man. I would advise that this amount be fixed at 100 cubic feet per minute for each person, estimating each mule equivalent to 6 men.

I take this position as a safeguard against any serious explosions, and then it is one that can be carried out economically, and will add to the material comfort of all persons employed inside of the mines.

The doors employed in your mines should receive immediate attention, and be maintained in better condition.

I request that special efforts be made to keep the currents up to every working face.

Brattices and over-cast air-ways should be examined and repaired at least twice each month.

All return air-ways should have a cross section of twenty-five square feet.

Second: New Richland Mines—The report on this mine I have addressed to the contractor, Mr. Wm. McNelis, but enclose herewith for your perusal.

Third: Dixon Slope—The work conducted here was not of a character to require report, no mining being carried on at the time.

Summary—I will send you my office maps by express, charges prepaid, and request a strict compliance with the acts relating to the maps.

I shall expect from each mine monthly reports of weekly measurements of ventilation currents in each of your mines, especially the mine worked by Mr. McNelis.

It affords me pleasure to refer to the intelligent manner in which your mines are managed, and, although slow to do so, I must congratulate your company upon the men in charge of the mines.

Trusting that your company will take immediate steps to increase the volume of air entering your mines, I am,

Respectfully,
F. P. CLUTE,
Commissioner of Labor, etc.

About this time Mr. Geo. Jamme, general manager of the company, had resigned, and action was deferred until his successor assumed control. In the meantime the following letter was received from W. K. Gibson, Mining Engineer:

DAYTON, TENN., Sept. 30, 1895.

Mr. F. P. Clute, Commissioner of Labor, Nashville, Tenn.:

DEAR SIR—Since your visit here I have had all the doors in the Nelson Mine overhauled and put in good working order; also, had the air-courses traveled and carefully examined, and I am now having all leaks in brattices closed. The disturbance in the air-currents, you found in No. 7 and No. 9 districts when here, was caused by a fall of roof in the pillar workings, close to the "face" of entry Z, the point I told you I had ended my examination a few weeks previous.

The fall was anticipated, and orders given to remove a brattice below as soon as it occurred, but this was not done as quickly as it might have been.

The water at the crosscut off No. 18 room also interfered somewhat with the current, but that course has been changed now, and cannot occur again.

Yours respectfully,
W. K. GIBSON,
Mining Engineer.

DAYTON, TENN., Oct. 21, 1895.

Mr. F. P. Clute, Commissioner of Labor, Nashville, Tenn.:

DEAR SIR—Your report of the recent inspection of the mines of the Dayton Coal & Iron Company, to Mr. Geo. Jamme, General Manager, has been referred to me, I being his successor in the capacity of General Superintendent. Your kind requests in reference to improving the condition of the Nelson Mine shall have immediate attention. The ventilation of the mine will be increased to the degree required as soon as we can purchase a new fan and erect it. I shall be pleased to meet you on your next visit to Dayton, by which time, also, I hope you may be able to note improvements at the Nelson Mine.

Yours truly,
THE DAYTON COAL & IRON CO.,
Per V. FERGUSON, *Gen'l Sup't.*

DUCKTOWN, TENN., Oct. 22, 1895.

Mr. V. Ferguson, General Manager Dayton Coal and Iron Company, Dayton, Tenn.:

DEAR SIR—Yours of recent date forwarded to me at this place, The Nelson Mine is a problem that is seldom met with in coal mining, and, from my best observations, cross-questioning, etc., I am fully convinced that you can be congratulated on the men you have in charge.

I shall certainly be pleased to make your acquaintance, and trusting it shall be a profitable and pleasant one to an official who is trying to advance the mining interests of the State, I am,

Very truly,
F. P. CLUTE,
Commissioner of Labor, etc.

Analysis of Nelson Mine coal:

Moisture	1.60
Volatile combustible matter	32.04
Fixed carbon	58.77
Ash	6.59
Sulphur	0.117

Coke from above coal:

Moisture	1.87
Carbon	72.45
Sulphur	0.679
Ash	25.68

NEW RICHLAND MINES, Rhea County.

Wm. McNelis, Contractor, Dayton, Tenn.
P. F. Lynch, Mine Boss, Glasgow, Tenn.

This mine is worked under contract to mine and deliver the coal on cars. Vein about 24 inches thick (Sewanee vein).

Mine was inspected Sept. 26, 1895; at that time there were employed in the mine 85 men and six mules. Mine is ventilated with an eight-foot "Cole" exhaust fan; it was making 62 revolutions per minute; inlet air current measured 4,080 cubic feet per minute at main entry, with several other openings. The outlet at fan measured 11,539 cubic feet per minute; amount required by law, 7,986 cubic feet per minute.

The following is a copy of my report to the contractor:

NASHVILLE, TENN., Oct. 3, 1895.

Mr. Wm. McNelis, Operator New Richland Mines, Dayton, Tenn.:

DEAR SIR—I will not admit of any aircourse with area of cross section less than 25 square feet in any mine, and those you have driven, that are intended as permanent ones, must be enlarged to that area; all airways, brattices, doors, and connecting walls at fan must be kept in as good air-tight condition as possible. I left blanks with Mr. Gibson, for you to report your air measurements to this Bureau, as required by Acts of 1881, chapter 170, section 8. I left a copy of the minig statutes with you, and shall expect a strict compliance with these laws on your part.

Yours truly, F. P. CLUTE,
Commissioner of Labor and Inspector of Mines.

The reports of air measurements show an improvement in the ventilation since my inspection. The map of mine is on file in this office. Mine was opened November 1894. Elevation above sea level, 1,018.04 feet. Ventilation reports are received each month.

Analysis of Richland coal:

Volatile combustible matter	25.29
Fixed carbon	64.39
Ash	10.32
Sulphur	2.48

Analysis of coke from Richland coal:

Carbon	74.10
Sulphur	0.634
Moisture	2.22
Ash	23.68

THE DIXON SLOPE, Rhea County.

This slope was driven through solid rock to reach the Nelson vein; practically no coal has been found in this mine. The slope forms one of the air inlets to the Nelson mine. The company is driving some test drifts to find the coal. Elevation of the mine above tide-water 614.42 feet. Length of main entry, 2,100 feet.

Fire-damp is given off in more or less quantities. The outlay in dead work on this mine has been over $100,000. Had this money been spent in sinking a shaft in gorge of Richland creek, about one mile above the Dixon slope, no doubt the investment would have given them some returns, for the indications are that the strata is less broken at that point, besides being nearer the center of their coal lands.

Feb. 25, 1895, Lihu Baker, W. Coleman, and J. S. Coleman were slightly burned by fire-damp in this mine. From the report to this Bureau, the accident was evidently due to carelessness on part of men.

STATE OF TENNESSEE,
BUREAU OF LABOR, STATISTICS AND MINES.

A true copy of the depositions taken by the Commissioner pertaining to the explosion in the "Nelson Mine," December 20, 1895, at Dayton, Tenn.

F. P. CLUTE, *Commissioner*.

DAYTON, RHEA COUNTY, TENN., Jan. 7, 1896.

J. M. HEAD, MINE BOSS.

Q. What is your name and age?

A. James M. Head; my age is 28.

Q. What is your occupation, and in what capacity are you employed at the "Nelson Mine," at Dayton, Tenn.?

A. I am a miner, and employed as mine boss at the Nelson Mine.

Q. How long have you been working in the Nelson Mine, and how much of that time have you been employed as mine boss?

A. I have been at this mine about seven (7) years; worked here before about one year, but was away about one year. The first work I did here was as a miner; after my return I worked as a miner for nearly one year, then I worked in capacity of fire boss for over one year, and after that I worked as extra fire boss until I was appointed mine boss; in that capacity I have served about three (3) years.

Q. What were your duties as fire boss, and your instructions from the superintendent?

A. My duties were to examine all working places in the mines for gas, and see that the mines were safe for employes; this I had to do before the miners entered the mines in the morning; I had instructions from the superintendent to cross out or make a danger mark at all places where gas was found in the working places, in order to prevent any person from entering the place with an open light, or incurring any risk whatever, no person being allowed across the danger mark except the fireman, unless permitted to do so by the fireman's instructions; this examination was made in the morning, as stated above, and after they fired their shots I made the second examination before the men were allowed to enter their working places, which was from 11 to 12 o'clock a. m.

Q. Since you have been mine boss have you continued to have these same examinations of working places made?

A. Yes, sir; my orders to my fire bosses were, "not to allow a man to enter any place where there was gas sufficient to be dangerous."

Q. What have been your instructions to make the mine safe for the men?

A. My instructions have been to fire bosses and inside men to see that all the places were safe; not to allow any dangerous top on haulways or rooms to remain without timbering or being taken down.

Q. Has the superintendent given you any particular instructions in reference to safety of the mine?

A. My instructions from Mr. Gibson have been to keep the mine absolutely safe in every respect, for the company did not desire to take any risks whatever.

Q. Where were you on the morning of December 20, 1895?

A. I came from home to the Nelson Mine about 6:15 o'clock a. m.

Q. Was that the date of the explosion, and at what time did it occur?

A. From my best information it occurred about 7:15 a. m.; I was at main entrance of mine, on outside; had just been talking to S. L. Umbarger, fire boss, who had just come on first trip out of mine, and stated to me he "had examined and found the mine safe and all working placess clear of gas, except No. 1, No. 2 and No. 16 rooms on entry K, in District 10, which" he said, "had such a very small quantity of gas, which I crossed out; the miners could have easily fanned No. 2 room and No. 16 room, and cleared them, but would not take any chances, and marked them out, and left them for A. J. Holden, the day fire boss, to clear of gas;" Wm. Poole came out and reported to me that there was a fall or some disturbance that blew the air about considerably; A. J. Holden, the day fire boss, was in the act of getting a light at entrance of mine, and I ordered him to rush on down the slope, that I feared there was an explosion, as I had no ground that was heavy enough to make such a disturbance in the air.

Q. Did you go in the mine immediately?

A. It was about three-fourths of an hour before I entered the mine, as I waited for Holden's report.

Q. Who went with you into the mine, and state what occurred?

A. W. K. Gibson, Superintendent, Jack Wilkes (col.), Abe Pryor and some two or three others accompanied me; we rode down on cars to near No. 7 siding; I examined the brattices from there to No. 9 siding; there I met A. J. Holden and S. L. Umbarger, with several others, trying to make their way into No. 10 district; we met the afterdamp at No. 7 siding on main entry U, and it was so strong at No. 9 siding that the men could not go any further; I found a brattice opposite where entry D meets main entry U that was blown down, which I had put up; then Mr. Gibson and myself got to No. 10 siding on main entry U; being almost overcome by after-damp we returned to outside, finding that we could not stand it to go any further; Mr. Gibson, the Superintendent, and myself then returned with a curtain to put up at entry E door, near No. 10 siding, which we thought would enable us to pass over to the far side of No. 10 siding, where we could get to K entry; we were both completely overcome; they had to carry Mr. Gibson to cars near No. 9 siding; I was just able to walk and had to return to outside.

Q. How many men were working in the Nelson Mine at the time?

A. That morning, as near as I can tell, there were 113 men entered and 20 mules.

Q. Of this number how many men were working in No. 1 district and how many mules? Give numbers of each district.

A. No. 1 district, 22 men and five mules; No. 2 district, 14 men and 1 mule; No. 7 district, 13 men and 3 mules; No. 9 district, 20 men and 5 mules; No. 10 district, 28 men and 6 mules; miscellaneous, 16 men.

Q. How many men and mules were killed in each district?

A. In No. 1 district, 4 mules killed; in No. 2 district, 1 mule killed; in No. 9 district, 2 mules killed and 1 man, Thomas Hawkins; in No. 10 district, 27 persons were killed, also 6 mules. The persons killed were as follows: W. J. Alexander, miner; Joe Miller, miner's laborer; Josh Bennett, miner; H. B. Williams, miner's laborer; Thomas Lane, miner, Willie Lane, miner; William Henderson, miner; L. T. Ferguson, miner; Arthur McMillen, miners' laborer; W. H. Davis, miner; John Manis, miner; John Westerfield (col.), miner; Norris Small (col.), miner's laborer; John Leach (col.), miner; Sam Wilson (col.), miner's laborer; J. A. Ivester, miner; Will Roddy (col.), miner's laborer; Robert Jewell, miner's laborer; Floyd Jewell, miner's laborer; Robert Hamilton, miner; Elder Morgan, trapper; Chas. Washburn, driver; Liney Walker, driver; John Able, driver; Cyrus Alexander, driver; James Johnson, driver; Wm. Brotherton, driver.

Q. What was Thomas Hawkins' duty on entry D, district No. 9, and where was his body found?

A. Hawkins was employed to guard against the approach of gas on entry D from some pillar works, which had fallen adjacent to entry D and which generated some gas; he was provided with a safety lamp, and was ordered to test it every time the drivers passed his station, and in case of any delay in trips he was ordered to make tests at least every 45 minutes; Hawkins' station was between two lamp stations on entry D, and no person was allowed to pass between these stations without a safety lamp; no open lights were allowed on entry D between those stations.

Q. Who attended to the lamp stations on entry D?

A. Ed Blackford cleaned and locked the safety lamps; his station was on D siding; Tommie Henderson took up the open lights and provided the drivers with safety lamps when they were going through the gas district in No. 9 district; his station was between rooms Nos. 22 and 26, on entry D at main air intake for that district.

Q. Who was the first man brought out after the explosion?

A. I understand that it was Norris Small (col.).

Q. What were the revolutions of the fan at time of explosion, and what amount of air was passing fan at time of explosion?

A. We were running the fan at 180 revolutions, as near as we could. The day previous to explosion the measurements were taken, and showed 34,580 cubic feet at fan per minute. The amount of air at inlet from Dixon slope, which ventilated District No. 10, measured at station E and K entry, 4,032 cubic feet per minute. The amount of air entering District No. 9 was 6,532 feet per minute, measured at stations F and G on entry E, the last named entry being the intake for Districts No. 9 and 7. The intake on main entry U showed 15,504 cubic feet per minute, measured at station A on main entry U. This ventilates Districts No. 1 and No. 2. The fan was making same revolutions as at time of explosion. Water guage at fan read 0.72, temperature 58° F., time 8 a.m., Dec. 19, 1895.

Q. Have you any reasons to believe that there was any difference at the time of explosion from these measurements, taken the day previous?

A. No, sir; the readings taken the day previous were about the same time of explosion, or within one hour of it at most, and fan recording same number of revolutions. I have no reason to believe there could be any difference, for nothing to interfere with the ventilation had been reported to me.

Q. When the explosion was reported to you what was your orders about running the fan?

A. I ordered it run up to 200 revolutions, and seeing that the fan did not rattle or rock, I ordered the men to run the fan from 200 to 220 revolutions.

Q. After my official inspection of the Nelson Mine, in September, 1895, were my orders for improvements carried out, and what were your instructions from Superintendent Gibson in reference to my orders?

A. We endeavored, to best of our ability, to carry out instructions as rapidly as possible. We took immediate steps to repair doors, and instructed my brattice man to get all brattices and doors in good shape. In District 7, where you complained of weak air-current, was improved immediately; all air-ways were examined and repaired.

Q. At what point on entry P 1 did you and others find the bodies of J. A. Ivester and Will Roddy?

A. We found them immediately under the place where the over-cast had been made. The over-cast was destroyed by the explosion, and Roddy was lying on part of brattice work of the over-cast, about square across the entry, on his back. Ivester was lying lengthwise, about center of track, head towards No. 7 room, on his back, with a rock weighing about 200 lbs. covering his head and shoulders, about 3 feet back of Roddy's body, and at right angles with it. Ivester had a coil of fuse about his right wrist, which had evidently partly unwound as he was thrown back.

Q. From what you can see by directions of force of explosion, where do you believe it originated?

A. From all indications, and from burns on props and coal, direction of force of explosion, I believe it started in No. 2, Bennett's room, off entry K.

Q. Would No. 1 door off P 1, and door on No. 7 room, have affected the collection of gas on entry K, had they been left wide open the night before?

A. No, sir, they would not.

Q. When did you examine the above doors, and what were their conditions?

A. I was passing every few days and considered them all right, and had ordered my brattice man to watch all doors and brattices and keep them in good shape.

Q. Was any one working in No. 1 room, entry K, on the day of the explosion?

A. The men were late, and had not gone in.

Q. Have you had any volume of gas to collect in No. 2 room, on entry K, at any time before the explosion?

A. None to amount to anything. The foreman frequently rereported a little gas in that room, but was always able to make it safe to work in.

Q. Was Bennett or Williams notified that their room contained gas that morning?

A. I don't know.

[Signed] **Jas. M. Head.**

Sworn to and subscribed before me, this Jan. 7, 1896.

F. P. Clute, *Commissioner.*

Will Head's deposition:

Q. What is your name and age?

A. W. T. Head; I am 25 years old.

Q. What is your occupation? How long have you worked for the Dayton Coal & Iron Company, and in what mine?

A. Miner; I have worked for the Dayton Coal & Iron Company about 4 years; most of the time in the Nelson mines; at present my work is in Dixon slope, where I have a contract driving an entry.

Q. Where were you on the morning of the 20 of Dec., 1895, at time of the explosion in Nelson mine, and what was your first knowledge of the explosion?

A. I was on entry 3 of Dixon slope; the first thing I thought the men in the head of my entry had gone up and set off some gas in head of entry; I had stopped on my entry holding out my lamp watching the flame, for the air did not seem so strong as usual; there was some unusual disturbance; while there the rush of air tumbled me back towards the mouth of the slope about 100 feet, then I believed it was an explosion in the Nelson mine.

Q. Where did you go, and how long before you entered mine again, and who with?

A. The men came running out and I told them that I thought it was an explosion in the Nelson mine; I went back and got the mule after force of the explosion, and went outside, and came to Nelson mine to find out what was the trouble, and after learning that it was an explosion, Mine Boss Head told me to get up four or five men and see if I could get into Nelson mine through the Dixon slope; Jno. McEntire, (col.), Elmore Randolph (col.), another colored man, also Albert Hutchinson; we entered Dixon slope about 8 o'clock, and went through to entry K in Nelson mine, and up that entry until we came where the slate had fallen, and was working, which turned us back; the after-damp was very strong and hot, yet a man could live in it; I was not sufficiently familiar with that section to know where to look for the men who were working there; it was my intention to return and get some man that was acquainted with that part; but coming out we missed our way, and we were coming rapidly and went into the "dip room," and found lying dead 3 colored men; I did not know but one of them, that was John Westfield; he was lying on his back; was not burned; the other 2 colored men I did not know; were not burned; I turned them over and went out to get more men to carry them out; I came out and got Tom Knight, Ed Craig, Wm. McNelis, A. P. Morgan, and some others; we returned to dip room and found John Leach in face of Will Davis' room, lying dead; his head and shoulders were under a loaded car, he was lying on his face, as though he had crawled there to get out of after-damp; he was not burned; then we came back and went into Manis' room and found John Manis lying dead in about 4 feet of his tool box, which was near his parting; we then found Will H. Davis lying dead, about 20 feet from Manis, lying on Manis' track, face down, head towards face of Manis' room.

Q. What position were John Westfield (col.), and two colored men you could not identify lying in?

A. The two men we did not identify were in the dip room, one with head toward entry K, about 20 feet from the entry, and the other about 30 feet from entry K, head same way; John Westfield was about 50 feet from K, with his head towards face of room.

Q. After taking out these bodies where did you go and what did you do?

A. I came to Nelson Mine after supper, and went in mine that night with Ed. Hayes and some others; we went to No. 10 side-track, on entry K, and worked there that night; we brought the body of Josh Bennett from the far end of the side-track.

Q. What date did you find the four men in No. 7 room?

A. About 1. a. m., December 27, 1895, and came out to make ready to bring them out.

Q. What was the date and position of the bodies of J. A. Ivester and Will Roddy when found in P. 1?

A. January 4, 1896; in company with J. M. Head and W. K. Gibson we found the body of Will Roddy, lying on his back, with head toward the air-way across the entry; I don't think he was burned; the body of J. A. Ivester was lying on his back, with head toward K, immediately under the overcast, about three feet from Roddy; he had a rock on his head weighing from 150 to 200 pounds; we took out the bodies as soon as we could get help.

Q. In your opinion, where do you believe the explosion originated?

A. I believe it started from No. 2, Bennett's place, on entry K, as everything indicates that to be the place.

Q. Since the explosion you have been over the exploded district several times, have you not, and you are familiar with the damage done by the explosion?

A. Yes, sir; I have worked there nearly every day since the explosion.

[Signed] W. T. HEAD.

Sworn to and subscribed before me this January 7, 1896.

F. P. CLUTE, *Commissioner.*

JOHN ROSE'S DEPOSITION.

Q. What is your name and age?

A. John Rose; age 41.

Q. How long have you worked in the Nelson Mine, at Dayton, Tenn.?

A. Eight years and a few days; miner most of the time, and timberman about three years.

Q. Where were you the morning of December 20, 1895, at time of explosion?

A. On outside, at mouth of mines; just lighted my lamp to start in.

Q. Where did you go, and state what occurred and the condition of everything generally.

A. In company with Sam Umbarger and others, we went to entry C, door off entry U, which we found blown down, and we put up the door to keep the after-damp off entry U and drive the fresh air to siding 10 on U; we put up the door and had to retreat back to fresh air; we staid there, and made an effort to get to 10 siding after the damp had cleared up, but could get no further than old C door, which had blown down; we put a curtain across that place; I came out and went back after Thomas Hawkins through No. 7, but I got down in after-damp and could go no further.

Q. Were the doors and brattices in the mine at the time of explosion in good condition?

A. Some of them in No. 9 district were old, but held air all right.

Q. Were any doors or brattices in district 10 in bad order?

A. They were in reasonably good order in district 10.

Q. After my inspection in September, did you repair curtain doors and brattices pointed out to you by Superintendent Gibson or Mine Boss Head that I complained of?

A. I was not brattice and door man at that time, but assisted to repair some brattices and doors on the intake air-way of 9 and 7 districts; also helped to clean up some falls in return air-way of same districts.

Q. Did you find a keg of powder at mouth of Josh Bennett's room? What was its condition?

A. It was burst open at side seam; it was over half full and not burned; the keg was stopped with a piece of paper—that is, the bung-hole or hole in end of keg.

Q. Was you with W. T. Head when the four men in No. 7 room were found? if so, give date and apparent condition of the men.

A. Yes, sir, I was with Mr. Head; it was on the 27th day of December, 1895; they were not burned any.

Q. Where do you consider the origin of the explosion was?

A. I consider the origin of the explosion in room No. 2 on K entry, John Bennett's room; I arrived at that opinion from the direction of the force of the explosion, that being the center.

[Signed] JOHN ROSE.

Sworn to and subscribed before me this January 8, 1895.

F. P. CLUTE, *Commissioner.*

G. W. GIBSON'S DEPOSITION.

Q. What is your name and age?

A. G. W. Gibson; 29 years old.

Q. What is your occupation, and how long have you followed it?

A. I am a miner, and have followed it nearly ten (10) years.

Q. How long have you worked in the Nelson Mine at Dayton, Tennessee?

A. With the exception of six (6) months I have worked in the Nelson Mine ever since it was opened.

Q. Where were you on the morning of Dec. 20, 1895, at time of the explosion?

A. I had left the mines before the time of explosion, and was on my way home.

Q. When you heard of the explosion did you return to the mines? and what was being done to get into the exploded district? i. e., give your account as it happened.

A. I returned to the mines about 9 or 10 o'clock, and entered with several others, at request of Mine Boss Head; we got to No. 10 side track on entry U, but were driven back by the after-damp, but before leaving put up a curtain at mouth of entry E, where a door had been blown down. We were driven back twice by the after-damp. After another attempt I was compelled to go outside, and from effects of after-damp was unable to do anything further that day.

Q. Did you enter the mine next day, and whose bodies did you find?

A. I went into the mines the morning of the 21st, in company with W. K. Gibson, V. Ferguson, F. P. Clute, John Thurman, and several others. We found Henry Williams lying dead on entry K, immediately on north side of fall, where it leaves entry L, at mouth of his own working place, lying on his left side, diagonally across entry, head towards entry L, badly burned and scarred up. We next found Thomas Lane, lying dead, a few feet above second dog-hole in his room, parallel with line of room, head towards face of same; he was lying flat on his face. His son, Willie Lane, was found lying dead by his father's side, with his head towards entry, face turned partially towards his father's, without any shirt on. Both of the latter were badly burned. We then found the body of Elder Morgan, a trapper; found on entry K, lying on his back a few feet above No. 7 room. He was lying across entry, with his head to the south, badly burned. I believe he was about six feet from his working place. We also found at No. 10 siding, in district 10, five dead mules.

Q. Have you seen any sign of scorched props, or anything burned at any particular place in the mines?

A. Yes, sir. 1st. In Thomas Lane's room, near by second dog-hole, we found several props slightly charred; looked like a flame of fire had been on them; also, we found small pieces of canvass cloth slightly burned at same place. 2nd. In Josh Bennett's place, from face on down to between the 1st and 2nd dog-holes, the props are charred, and coal on ribs is slightly coked or charred.

Q. Have you seen any evidence elsewhere in the exploded district of fire, or a gas explosion?

A. Yes, I believe I have in the air-way parallel with P 1 entry. I have seen the coal dust blown down onto side of props and slightly charred. This was about the first dog-hole on air-way from No. 7 room. Also, in No. 8 room, about 250 feet from head, there are some props charred slightly; but about three months ago I accidentally fired a small volume of gas about this same place, and that stood a chance of charring these props, but don't think it probable, as these were the roadway props, and the gas I set off burned along the top near by where these props were charred, but on the upper left-hand rib.

Q. Have you been working in the exploded district since the explosion, and watched for evidence of burns from the gas?

A. I have only lost two or three 8-hour shifts since the explosion, and have watched for evidence of fire; and in No. 8 room, where the props were charred, W. K. Gibson and myself found where something had been burned, but could not tell what it was; it was about 2 ft. across, and covered with charred coal, lying in roadway at parting near No. 7 room.

Q. Was you with party that removed the four bodies found in No. 7 room Friday, Dec. 27, 1895?

A. Yes, sir.

Q. Who were they, and how were they found lying?

A. 1st. Cyrus Alexander was lying dead near by the 5th dog-hole in P 2 in No. 7 room, lying with his face down, head towards P 2, badly swollen, but could not tell whether he was burned or not. 2nd. Floyd Jewel, as we took him to be, was lying dead about 50 feet beyond where Alexander was found, near by frog of parting going into No. 7 room, lying on his face, head towards P 2, badly swollen; could not tell whether he was burned or not, in the condition he was in; besides, we were using safety lamps, which gave but a small light. 3rd. We found a body that we took to be Bob Jewel; he was lying dead in No. 8 room, second dog-hole in No. 8 from No. 7 room, on his face, head towards P 2, badly swollen; his condition was same as the others. 4th. Bob Hamilton was found lying dead in the dog-hole near where Bob Jewel was found; he was lying with feet towards No. 7 room, and his head towards No. 8 room, his face towards P 2, against right-hand rib of the dog-hole. I did not see any burn on him.

Q. In your long service with the Dayton Coal & Iron Company, Limited, have the men in charge of the mines exercised every caution to protect their men from danger?

A. Yes; I have worked in some of the most dangerous places for gas, etc., and they have always cautioned me, and instructed me how to keep from getting hurt, and also how to protect others in my charge, as I have had charge of small crews in dangerous places.

Q. Previous to time of explosion had you noticed any doors or brattices in district 10 that were in bad condition?

A. No, sir, none that I considered in bad condition.

Q. Were you with the party that found J. A. Ivester and Will Roddy on Jan. 4, 1896?

A. I was with the party, but had stopped about 100 feet back; I assisted in taking Roddy's body out.

Q. You have explored No. 10 district several times since the explosion, and, from evidence shown by force of explosion, where do you believe the origin of the explosion was?

A. The best that I can find out, from observation, I believe it occurred in Bennett's room.

Q. Have you worked in Nelson Mine since the explosion?

A. Yes, sir, I have been there nearly every day since; have only missed one or two 8-hour shifts.

[Signed] G. W. GIBSON.

Sworn and subscribed to before me, this Jan. 7, 1896.

F. P. CLUTE, *Commissioner.*

J. L. HUNTER'S DEPOSITION.

Q. What is your name and age?

A. J. L. Hunter; age, 28.

Q. What is your occupation, and in what capacity were you employed at time of explosion, Dec. 20, 1895, in the Nelson Mine, at Dayton, Tennessee?

A. Miner. I was employed digging coal and testing gas in No. 7 district of Nelson Mine.

Q. Did you examine all working places in morning, before the men entered their working places?

A. Yes, sir.

Q. What has been your orders from the company's officials in charge of mine in reference to your examinations, etc.?

A. If I found gas, it was my duty to clear out the gas and make the place safe; if not, stop the men from entering by crossing it out if I could not clear the place.

Q. Where was you at time of explosion, Dec. 20, 1895?

A. I was in room No. 26 of district 7.

Q. Please state all about the force of the explosion at that point, and what occurred?

A. I felt a small shock; the wind blew out my lights; I was just lighting my lamp to make my rounds; I started back towards main entry of No. 7 and got me a light; went back and made my rounds; I then returned to main entry U and found out there had been a bad explosion, and went to work to do what I could to get out the men.

Q. Who did you help rescue, and what was condition of the bodies rescued?

A. Thomas Hawkins was the only man I helped get out; we found him lying dead, lying on his face, about 30 feet west of his door, with head towards No. 7 district; he was not burned, but had a bad gash in back of his head.

Q. How many dead mules, and where and how did they lay at Hawkins' place on D, in No. 9 district?

A. Two mules; one on one side and one on the other of the door; could not tell whether they were burned; the hair was not burned.

Q. Did you see any evidence of fire at this point?

A. Not a bit.

Q. Did you find any changes in the air after Inspector Clute's visit here in September, 1895?

A. Yes, sir; the air was a good deal better than when he made his examination.

Q. What changes did the company make in No. 7 district?

A. They repaired the doors, brattices and air-ways; pumped the water out of air-way.

[Signed] J. L. HUNTER.

Sworn to and subscribed before me, this Jan. 4, 1896.

F. P. CLUTE, *Commissioner.*

S. E. JEWELL'S DEPOSITION.

Q. What is your name and age?

A. S. E. Jewell; I am 24 years old.

Q. What is your occupation, and in what capacity have you been employed in the Nelson Mine at Dayton, Tenn.?

A. Miner; for 8 or 10 months as brattice man.

Q. When did you examine the brattices of districts 10 and 9 in the Nelson Mine, and what were the conditions of them?

A. I was passing and examining them frequently; had finished a brattice in head of P 1 about four (4) days before explosion; the brattices of district 10 were in fair condition.

Q. What was the condition of the doors in district 10 the last time you examined them?

A. They were pretty fair, with exception of two doors; one would stand open, would not stay closed unless closed by some one; this door was on P 1 No. room; I had worked on the door, but the frame was not put in right; the other door was on No. 7 room above P 1; it would shut itself except about two inches. I had a hook in my hand and was going there to fix the door at time of explosion.

Q. Where were you at time of explosion on morning of Dec. 20, 1895?

A. I was at No. 9 dog-hole above the switch on main entry U; I had stopped at my box, and after force of wind I got down in hot after-damp and Jim Riley and others helped me out from about foot of muckle.

Q. Did you go in again that day or since?

A. No, sir.

Q. Was force of air from explosion sufficient to knock a man down?

A. Yes, I think so.

Q. Were you brattice man after I made my inspection of the mines last September?

A. Yes, sir.

Q. What were your orders about making certain repairs to brattices and doors that I ordered done?.

A. I had orders from Mine Boss Head to examine them all, fix doors so they would shut by themselves and make all brattices tight.

Q. Had you done so to best of your ability?

A. Yes, sir.

Q. Did you clean out air courses of Nos. 7 and 9 districts, and make certain doors and brattices tight in those districts?

A. I did not clean out airway, but fixed doors and brattices; I always reported the troubles in airways to mine boss if I found anything blocked off.

[Signed] S. E. JEWELL.

Sworn to and subscribed before me, this January 4, 1896.

F. P. CLUTE, *Commissioner*.

W. B. WALKER'S DEPOSITION.

Q. What is your name and age?

A. W. B. Walker; age, 30 years.

Q. What is your occupation?

A. Miner.

Q. Where have you been employed and how long have you worked there?

A. I have worked as a miner about six years; most of that time for the Dayton Coal and Iron Co., at Dayton, Tenn.

Q. Where were you on the morning of Dec. 20, 1895, at time of explosion in the Nelson Mine?

A. I was working in the New Richland mines.

Q. Did you go in the Nelson Mine just after explosion, and state the circumstances attending your work?

A. The first trip I made in the Nelson Mine after the explosion was about 6 p. m., in company with P. F. Lynch and several others; we went up entry D to a point a little beyond the overcast, and made an examination for fire and gas, but found none; we came back to No. 10 district and traveled entry G, testing for gas, but found none; we then returned outside.

Q. Have you worked with rescuing parties ever since the explosion?

A. Yes, sir; I have been with them.

Q. Have you found any evidence of fire or where gas has been exploded?

A. The only places that I have noticed any indications of fire were in Josh Bennett's room and opposite last break-through from Bennett's room; in Lane's room some props are scorched; also some signs of burn in No. 7 room between P 1 and head of room on props in that room.

Q. What did you find in Bennett's room to indicate that fire had been in that room?

A. We found scorched props, and the coal on right rib between first dog-hole and face of room is charred or coked.

Q. Did you notice the direction of force of explosion from any point? if so, from what point?

A. It has blown from Bennett's room into Lane's, and also from Bennett's room back towards side track; everything indicates that Bennett's room is the center of the explosion.

Q. You were with party that made an examination of district No. 10, Jan. 6, 1896; please give the names of parties and where you found evidence of fire.

A. W. K. Gibson, V. Ferguson, F. P. Clute, J. M. Head, W. T. Head, G. W. Gibson, P. J. Lynch, John D. Hughes, Sam Umbarger and myself; we found evidence of fire in room No. 1 at side track at junction of K and L; also room No. 2, Bennett's place, room No. 3, Lane's room, No. 7 room between P 1 and head, and also some slight signs between P 2 and K on 8.

Q. Where do you believe the explosion originated from general appearence of things in No. 10 district of Nelson Mine?

A. It is my opinion that it was fired in Bennett's room, between first and second dog-hole in his room; it seems to be the centre of the explosion; all indications show that to be the fact.

Q. Did you ever work in No. 1 room at junction of L and K entries, and if so, did you ever accidentally fire the gas in that room?

A. Yes, sir; I worked there from about the 1st of July, 1895, to August 1, 1895, and had my leg broken in that room by falling slate; during the time I worked there the gas caught fire, the first time in a hole while tamping, the second time from an open lamp while working there; we had to fan our room nearly every day.

[Signed] W. B. WALKER.

Sworn to and subscribed before me, this January 6, 1896.

F. P. CLUTE, *Commissioner.*

WILL COX'S DEPOSITION.

Q. What is your name and age?

A. Will Cox (col.); 19 years old.

Q. What was you employed at in the Nelson Mine at time of explosion, and how long had you been working there?

A. Was a driver, but that morning I was going to head of P 1 to run a small hand fan for Mr. Iverson; I had worked in mines nearly three months.

Q. Where were you at time of explosion, and what happened to you?

A. I was near No. 9 side-track on main entry U; I was waiting for a safety-lamp; I heard the wind coming, and started to run, but it threw me across the track, and I tried to crawl, but couldn't, for the after-damp got me down; Geo. Cunningham (col.), who had come from No. 1 district with John Hughes, a driver, carried me out, and I remembered no more until I reached outside.

Q. Did you see any fire or flash at the time of explosion?

A. No, sir.

Q. Have you been in the mine since?

A. No, sir, I have not been back.

Q. Did you hear any report from explosion?

A. No, sir; nothing but the sound of the rushing wind.

[Signed] WILL COX.

Sworn to and subscribed before me, this January 5, 1896.

F. P. CLUTE, *Commissioner.*

Will Cox re-examined:

Q. Do you know anything about the condition of brattices and doors in Nos. 7, 9 and 10 districts previous to explosion; if so, please state what it was?

A. I don't know anything about the brattices; the doors were good doors.

Q. Were these doors and brattices reasonably good last September?

A. Yes, sir.

[Signed] WILL COX.

Sworn to and subscribed before me this January 8, 1895.

F. P. CLUTE, *Commissioner.*

JOHN O. THURMAN'S DEPOSITION.

Q. What is your name and age?

A. John O. Thurman; about 20 years.

Q. How long have you worked in the Nelson Mines, at Dayton, Tenn.?

A. I have been working off and on for over two years.

Q. Where were you at time of explosion, December 20, 1895?

A. I was at work in the New Richland Mines, digging coal.

Q. Did you hear the report of the explosion?

A. I do not know whether I heard it or not; I heard something, but could not tell whether it was a fall or not.

Q. What time did you enter Nelson Mine?

A. I guess when I entered it was about half-past 12, with J. L. Hunter, Andy Majors, Will Smedley, Mat Black, and others.

Q. Where did you go in the mine, and state circumstances that happened?

A. We went down main entry to No. 7 parting, and through No. 7 district to entry D, in No. 9 district; on entry D we found a little after-damp near No. 22 room; then we went down and found two mules near entry D door, both dead, with an empty car between them; about thirty feet beyond the door we found the body of Thomas Hawkins; he was lying with both hands clinched against his face, face down, stretched out, feet toward entry U; I looked for burns, but did not see a hair singed, but found a big gash in back of his head; we removed his body outside; I returned back in mine as soon as we could get a fresh relay of men; I made way to No. 10 side-track on main entry U; here I met a crew of men coming back from toward K side-track; then P. F. Lynch, John McMillen, Asa Newman and myself continued our way to side-track at junction of K and L; we crossed over two heavy falls on the way; we found two cars under the last large fall at side-track; we found the body of Chas. Washburn lying flat on his stomach next to rib, and a piece of slate that would weigh about twenty-five pounds on small of his back; he was burned badly; his clothes were singed some; we removed his body across the fall and waited for help; after more men arrived we returned to side-track, and found the body of Wm. Brotherton, a driver; he was about thirty feet beyond where we found Washburn; he was lying on his belly and partly under a car; there were two dead mules close to Brotherton's body; the after-damp affected me so that I had to come out of mine; it was after dark when I come out.

Q. When did you return to the mine again?

A. As soon as we could get a fresh crew of men.

Q. Where did you go then, and what did you find?

A. I only went to No. 8 side-track this trip, and staid there some time, and then returned to outside; went back into mine again before morning.

Q. If you went into mine Saturday, give account of what bodies were found.

A. We found Henry Williams, Thomas and Willie Lane and Elder Morgan.

Q. In what part of the mine do you think the explosion happened, and give your reasons for your opinion?

A. I think it took place in Josh Bennett's room, on entry K, for the timbers are heavily scorched, and the dust and timber are blown from that point.

Q. Have you seen evidence of any fire elsewhere?

A. We found one place on P 1 air-course near No. 7 room, and a few isolated props in No. 8 room, but the latter might have been scorched on outside before the timber was sent in.

Q. In No. 7 room was there evidence which way the explosion traveled?

A. Yes, the dust showed that it traveled up No. 7 room.

Q. Were you present when the bodies were found in head of No. 7 room?

A. No sir, but I helped to remove them.

Q. Were you present when the bodies of Ivester and Roddy were found?

A. I was with the party that found them and helped to bring them out.

Q. Who found these last two bodies?

A. Mr. W. K. Gibson, J. M. Head, and W. T. Head.

his
JOHN OSCAR + THURMAN.
mark

W. K. GIBSON, Attest.

Sworn to and subscribed before me, this Jan. 5, 1896.

F. P. CLUTE, *Commissioner.*

A. J. HOLDEN'S DEPOSITION.

Q. What is your name and age?

A. A. J. Holden; am 32 years old.

Q. What is your occupation and by whom employed?

A. I am employed by the Dayton Coal & Iron Co., in the Nelson coal mine, as fire boss and first assistant mine boss.

Q. How long have you worked in the mines?

A. About thirteen years.

Q. How long have you worked in the Nelson mine?

A. About nine years.

Q. What time did the explosion occur on Dec. 20, 1895, in district 10 of Nelson mine?

A. About 7:30 a. m. (local time).

Q. How far did you enter the mine after the explosion, and who with?

A. By myself, and went to No. 9 door on main entry U, where I found Oliver Morgan, a trapper, suffocating from the effects of after-damp, and brought him to fresh air, and returned to a point near the electric pump, and assisted in bringing out another man; then I came to outside, overcome from the effects of the after-damp.

Q. Did you return to the mine again that day, and to what point?

A. Yes, I returned to No, 10 on entry U and assisted in putting up some brattice cloth at that place; this was in the afternoon.

Q. When and where did you enter the mines next?

A. At Dixon slope entrance Saturday morning about 8:30 or 9 o'clock; Wm. McNelis, L. E. Craig, and two or three others were with me.

Q. Who did you find and where were they found?

A. Lon Ferguson was found first; was in a room off from entry K (district 10); was found dead, lying with his head towards the Dixon slope; he had a cut behind his ear; this was in No. 9 room; he was blistered on exposed parts; we next found Arthur McMillin lying dead, about 10 feet south-west of Ferguson; he was blistered on exposed parts; he was lodged against a prop, apparently as though he had been blown there; we next found Wm. Henderson lying dead in his working place adjoining the room where we found Lon Ferguson and Arthur McMillin; he was in his parting, with his head toward the Dixon slope; we took these bodies out through Dixon slope.

Q. Have you formed any opinion as to point of origin of the explosion; if so where do you think it occurred?

A. I am of the opinion that it occurred about Josh Bennett's or

Tom Lane's room, which is evident by the force of explosion, shown by scattered debris.

Q. Have you made it a special practice to caution the men in the mines working under you against crossing any danger mark made by the gas inspector?

A. I have.

[Signed.] A. J. HOLDEN.

Sworn to and subscribed before me, this Jan. 8, 1896.

F. P. CLUTE, *Commissioner.*

J. E. BLACKFORD'S DEPOSITION.

Q. What is your name?

A. J. E. Blackford.

Q. What is your age?

A. Twenty-four.

Q. How long have you worked in Nelson Mine, and what were your duties at time of the explosion, Dec. 20, 1895?

A. About one year; my duties were tending to the safety lamps on entry D, No. 9 district. The lamps were used to pass through that gaseous district, along entry D to top of the hill at trappers' station; the drivers used them all the time through same district.

Q. Where were you and who was with you at time of the explosion, Dec. 20, 1895?

A. I was in the car with D. D. Davis, the driver who drove through the gaseous district on entry D. I did not see anyone else until after the explosion.

Q. Did you and Davis have open lights at the time?

A. I had no light; Davis had a safety.

Q. You were going towards the door attended by Thomas Hawkins. About how far were you from the door?

A. I think about fifty feet, when the explosion occurred.

Q. Did you see the flash of the explosion?

A. I did not see any flash or fire.

Q. From what direction did the force of the air from explosion come?

A. The force came in behind me from No. 10 haulway, which is now abandoned?

Q. After the explosion where did you go and who was with you?

A. I went up D to No. 7, and followed No. 7 to main entry; near top of hill and side-track on D, I met William Hale, John McEntire, Sam McMillin, Charley Sharp, and some others; Wm. Hale took me through No. 7 to main entry; when near main entry we met the after-damp; I came out of the mine at main entrance.

Q. Have you been in mine since?

A. No, sir.

Q. Did you see Thomas Hawkins, either before or after the explosion?

A. I saw Thomas Hawkins when he got his lights at No. 9 side-track; he went in ahead, and I followed after in a car.

Q. Did the force of wind or air knock you out of car?

A. Yes, sir.

Q. Were you injured any?

A. One gash cut in my head, and several bruises about head, body, and my legs.

Q. Was Oscar Hawkins with you, and did he come out of mine with you?

A. He was behind me at time of explosion; I was blown ahead of the mule that was pulling the car I was riding in; after the explosion was over we called to each other, and met in sight of open lights, where we met Wm. Hale and others.

Q. How far apart were you and Oscar Hawkins when explosion was over?

A. From way he spoke, we were twenty or thirty feet apart, I think.

Q. Had entry D been sprinkled previous to explosion, and what was the custom in this respect?

A. The entry had been sprinkled a few days before, and was usually sprinkled whenever the entry became dusty.

Q. Have the men in charge of the mine ever instructed you to use every safeguard to prevent any accident?

A. Yes, sir.

Q. Were all the safety lamps in your charge in good condition the morning of explosion?

A. Yes, sir.

Q. Do you know in what condition the doors and brattices were in No. 9 and No. 10 districts at time of explosion?

A. So far as I know they were in good shape.

[Signed] J. E. Blackford.

Sworn to and subscribed before me, this Jan. 8, 1896.

F. P. Clute, *Commissioner.*

S. L. UMBARGER'S DEPOSITION.

Q. What is your name?

A. S. L. Umbarger.

Q. What is your age?

A. Thirty-two, nearest birthday.

Q. How long have you worked in coal mines?

A. About 12 or 13 years.

Q. How long have you worked in the Dayton Coal and Iron Co.'s mines—the Nelson Mine?

A. About six (6) years.

Q. In what capacity are you now employed, and what are your duties?

A. My regular work is that of a miner, but act as extra fire-boss when my services are required.

Q. Have you acted as fire-boss previous to December, 1895?

A. Yes, and a good long while.

Q. Who taught you how to detect gas with a test lamp?

A. Capt. J. B. Carter and Jim Delozier; I saw safety lamps used before at No. 7 slope, Pratt Mines, Ala.; I mean test lamps.

Q. Where were you the morning of Dec. 20, 1895, up to 7:30 a. m.

A. I went in the Nelson Mine on the morning of Dec. 20, 1895, about 2 o'clock.

Q. Were you acting as fire-boss?

A. Yes, sir.

Q. What are your instructions in regard to reports of gas in rooms and working places?

A. My instructions have been to "mark out" all places containing any gas.

Q. Where did you find gas in the mines on the morning of Dec. 20, 1895, and give name of the working places?

A. No. 1 room on K entry contained small quantity; I don't know who worked there, and was marked out; No. 2 room on K entry contained a very small quantity of gas, and was marked out in usual manner; this was Josh Bennett's room; No. 16 room on K entry contained a small quantity of gas, and was marked in usual manner; on entry D, district No. 9, there was gas in the dog-hole connecting with pillar workings from F; cannot state as to quantity; entry G was an abandoned entry and was marked out altogether; also all rooms off from G; F entry and rooms from same were all marked out.

Q. What do you mean by being marked out?

A We generally take a plank, prop, tie or anything long enough to reach across the track, and take a shovel and prop it up on a board or tie across the track, making X marks, and write the word "gas" with chalk on shovel or timbers.

Q. What time did you leave rooms Nos. 2 and 3 on entry K on the morning of Dec. 20, 1895?

A. About 4:30 a. m.

Q. You state that you found gas there; how did you mark room No. 2—Bennett's room?

A. I took a shovel and wrote the word "GAS" on it and made four (4) crosses on it, one on each corner with white chalk, and took a tie and laid above the shovel, or toward the face of his place, and wrote "GAS" on the tie, and made several X marks with white chalk on the tie; I placed this mark between entrance to room and first dog-hole on right, the marked sides facing entrance, across the track; also I marked a shovel next to Mr. Lane's room in dog-hole to guard the approach to Bennett's room from Lane's room, or from No. 3 to No. 2 room.

Q. From whom did you receive your instructions about marking danger lines or marks?

A. Mr. W. K. Gibson, Supt., and Jas. M. Head, mine boss, have both given instructions to mark out all places containing any gas.

Q. Did you enter the mine after the explosion on the morning of Dec. 20, 1895?

A. Yes, sir.

Q. In company with whom?

A. John Rose and several others.

Q. How far did you go on first trip after the explosion?

A. I went to No. 9 siding on main entry U, and was stopped by after-damp at that point, and did not go in again that day.

Q. When did you go in next, and how far or to what point?

A. About 5 a. m. on the 21st went to side track at junction of entries K and L, No. 10 district, for purpose of assisting in bringing out the remains of Josh Bennett.

Q. Was the body of Mr. Bennett badly burned or disfigured?

A. I did not examine him except his face, and saw that it was lacerated or bruised badly.

Q. Did you make a written report of the condition of the mine on the morning of the explosion in a book kept by the Superintendent for that purpose?

A. Yes.

Q. What time that morning did you make that report?

A. I completed the examination about 5 a. m.; filled out report on book later.

Q. What kind of lamp do you use in testing for gas?

A. A Davy testing lamp.

Q. Do you know when the last work was done in Bennett's place (No. 2 room on K), or when did the men leave there the morning of Dec. 20, 1895?

A. They left there about 3 that morning.

Q. Who worked in that place that night—No. 2 room on K?

A. John Horny and George Henderson.

Q. Was there any one with you when you marked the danger line in No. 2 room, Bennett's place?

A. Yes, sir; George Henderson, who had been working in that place that night, and he joined me in the balance of my inspection work of that morning.

Q. In your opinion, from what you have seen of the force of the explosion, where do you believe the explosion originated?

A. In my opinion it did occur in the immediate neighborhood of the side track at junction of entries L and K.

[Signed] S. L. UMBARGER.

Sworn to and subscribed before me, this Jan. 8, 1896.

F. P. CLUTE, *Commissioner*.

W. K. GIBSON'S DEPOSITION.

Q. What is your name and age?

A. W. K. Gibson; am 29 years old.

Q. What is your occupation, and how long have you had charge of the Dayton Coal & Iron Co's. mines at Dayton, Tenn.?

A. Engineer of Mines; I was Engineer of Mines two and one-half years, after which I was given control of the mining operations, which position I now hold, making a total of seven and one-half years.

Q. Where were you at time of explosion Dec. 20, 1895?

A. At breakfast at Dayton City Hotel.

Q. How long after the explosion occurred before you entered the mines?

A. As near as I can tell it was about three quarters of an hour; I rushed up there as soon as I got intimation of it.

Q. Give the particulars of your work that day.

A. As soon as I completed arrangements for sending rescuing party by way of the Dixon slope, and learning some details as to seat of explosion, I entered the mine, accompanied by Mine Boss Head and others, and made our way to No. 10 side-track on main entry U, in order to ascertain how the return airway was; here we found entry E 1 door open and the air traveling all right from No. 10 district; the after-damp was so strong we were compelled to retreat; we then returned and had a curtain stretched across the entry in order to divert the air current, so as to clear the side-track, thinking there might possibly be some of the drivers there; by this time I was so overcome by effects of after-damp I had to be taken outside; I returned some time afterwards, cannot state how long afterwards; I made another attempt, but failed either to reach the side-track or the door in entry D, where I understood Thomas Hawkins was, and soon afterwards became unconscious from the effects of the after-damp, and remember no more until I reached outside; I was unable to make any further efforts that day.

Q. When did you make your next attempt, and who was with you; give full particulars?

A. Saturday morning, Dec. 21, 1895, accompanied by General Superintendent Ferguson, Mine Inspector Clute, and several others, and was joined at No. 10 side-track by G. W. Gibson and Jno. Thurman; the four gentlemen named and myself made our way towards No. 10 district, a little beyond entry G 1; here we encountered a large fall; Gibson, Thurman, and myself made our way over the falls and immediately on other side of the one, entry K, close to the entrance of Bennett's room, we found the body of Henry Williams as described in deposition of Geo. W. Gibson, and continuing our exploration we found the bodies of Thomas Lane and son in their room, also as described in deposition of Geo. W. Gibson; returning to entry K, we soon came upon the body of Elder Morgan, as also described in said deposition; we then went up No

7 room and found the presence of gas fully 300 feet from entry K; we then returned to outside, and went back into mines shortly afterwards and had the bodies of those found removed; the same evening we met Wm. McNelis and A. J. Holden, and party, who had entered from the Dixon slope side; these I instructed to explore Henderson's room, and soon afterwards learned they bad found his body, which I instructed to have removed by way of the Dixon slope; on Sunday morning at 6:30 I re-entered the mine and superintended the removal of four dead mules at side-track at junction of entry K and L, the intervening falling debris having been removed in the interval; State Mine Inspector was with me here until noon, and accompanied by him and G. W. Gibson we examined entry G for a distance of several hundred feet, also No. 7 room; on G we found no signs of gas or disturbances due to the explosion, but in No. 7 room we found the gas had backed towards entry K about 60 feet since previous examination the day before; after removing the remaining mule from side-track at junction of entries K and L, and the fallen debris which covered it, we decided to remove the men who were cleaning up the falls there; part of Monday I spent removing the gas from No. 7 room, and making general examination, accompanied by State Mine Inspector Clute and Will Head, after which I returned outside; in the evening at 4 o'clock, accompanied by W. T. Head, G. W. Gibson, W. B. Walker, John Hughes, and Jesse Green, made an examination of Bennett's and Lane's rooms, returning by way of Dixon slope.

Q. What evidence of gas explosion did you find in Bennett's and Lane's room?

A. In Bennett's room I found the props charred, and coal on right rib slightly coked from the face down to between first and second dog-hole, and in Lane's room, opposite to the last dog-hole or crosscut, I found considerable dust on side of props next to Bennett's room, indicating an explosion from that direction; to all appearances, this seems to have been the point of origin. This is strengthened by the fact that in Tom Alexander's room, opposite side of entry K, there is a fall of top of roof and gob, the timber and gob being blown from the rib side next to entry K; also, at the mouth of Alexander's room, one or two timbers of a crib there have been blown out in a similar way; besides, there is a car on other side of crib that has been blown off from track, all of which indicates that the force came from the direction of Bennett's room.

Q. Did you find a miner's lamp in Bennett's room, and was there a name on it?

A. Yes, I found a miner's lamp on left rib of Bennett's room; this was on the 2d day of January, 1896; it was lying 12 or 15 feet from entrance of room, or point where the body of Williams was found; this lamp had Williams' name scratched on the lid; at time I found lamp I was accompanied by J. D. Hughes, Joe Hossler (col.), and Abe Pryor (col.)

Q. What day did you find the bodies of the four men in No. 7 room?

A. These bodies were reached by the morning shift, 27th of December, 1895; on same evening I had them removed to the outside.

Q. Who were they, and how were they lying?

A. The first body was Cyrus Alexander, lying between rails, face downward, opposite the 5th dog-hole above entry P 2; his head was towards entry K. The next was Robert Jewell, found in a similar position, at frog No. 7 and 8 room, about 30 feet beyond where Alexander was found. The next was Floyd Jewell, who was found in a similar position at second dog-hole beyond the above frog, about 120 feet beyond where Robert Jewell was found. The next was Bob Hamilton, who was found in dog-hole 15 feet or so below track, and immediately opposite Floyd Jewell; he was lying on his right side, head towards Jewell, and close to right rib of dog-hole.

Q. What is your opinion of the cause of the death of the four men, and what position do miners usually assume in such cases?

A. Their death was undoubtedly due to the effects of after-damp, the result of the explosion. Miners, in such cases, are generally found in the position that these men were found; the natural tendencies would be to protect the exposed parts of their body from the intense heat.

Q. Did you find the body of J. A. Ivester and his laborer (Will Roddy, col.), and when, and where were they?

A. I was present with J. M. Head and W. T. Head on Saturday, Jan. 4, 1896, when these bodies were discovered. We found them on entry P 1, immediately under the overcast, near head of said entry. Ivester was lying on his back, near center of roadway; head covered by a large rock, weighing probably 150 pounds, with a coil of fuse around his right arm; feet towards head of entry. Roddy was lying on his back on the fallen timbers of the overcast, directly across the entry, head towards air-course, about 3 feet from Ivester, 200 feet or so from their working place.

Q. Do you know of anything that might have led to such a result as this explosion, that has not been investigated by myself?

A. No, sir.

Q. I understand that you are a certificated mine manager from Scotland. If so, give me an idea of your experience in mining?

A. I hold a first-class certificate as a mine manager from the British Government. My experience extends over a period of 14 years, part of which time I was assistant manager of two of the largest collieries in Scotland, both of which gave off a considerable quantity of gas, necessitating the use of safety lamps to a great extent.

Q. Were you present in Thomas Lane' sroom when his coat and vest were found, and what did they contain?

A. Yes; his vest contained a small measuring tape, an open-face watch; the outside case or tin case was shattered; crystal was broken; the watch registered the hour of 7:22½.

Q. Have you prepared a true copy of map of districts 7, 9 and 10 of the Nelson Mine, to accompany your deposition?

A. I have.

Q. Please detail your instructions to mine boss and fire bosses for protection of men in your mines?

A. My instructions have always been very explicit to these men in regard to safety of mine and employes to take every possible precaution; allow no one to enter any place that was at all unsafe, either due to the presence of gas, or other causes; keep the brattices and doors air-tight and in good repair; see that the air-ways were not obstructed in anyway.

[Signed] W. K. GIBSON.

Sworn to and subscribed before me, this Jan. 8, 1896.

F. P. CLUTE, *Commissioner.*

SAM DONALDSON'S DEPOSITION.

Q. What is your name and business?

A. Sam Donaldson; business, undertaker.

Q. Did you prepare for burial any of the victims of the mine explosion that occurred in the Nelson Mine at Dayton, Tenn., December 20, 1895; if so, how many, who were they and what was their condition?

A. Yes, sir; fourteen.

Henry Williams—Had an arm broken; was burned on face and hands, also his body was more or less burned; badly bruised.

Thomas Lane—Was badly burned; no limbs broken; not badly bruised; bad gash in hand, and head bruised.

Will Lane—Was not burned much; no limbs broken; his moustache was burned.

Elder Morgan—Was burned badly; no limbs broken; his head and face were bruised.

Lon Ferguson—He was burned; his hands and face were burned, and a gash in his head.

Arthur McMillan—Was burned in the face; no limb broken that was visible.

Josh Bennett—Was burned badly all over, and one leg blown partly off, one arm broken, and his head partly bruised.

John Westfield (col.)—Was not burned or bruised in any manner.

John Leach (col.)—Was not burned or bruised in any manner.

Sam Wilson (col.)—Was not burned or bruised in any manner.

Norris Small (col.)—Had burn about the size of my hand on his left leg below knee; was not bruised any.

Floyd Jewell—Was burned on exposed parts of his body; the burns were not deep, but the skin on face and hands was burned.

Robert Jewell—He was burned in some places slightly; not as bad as Floyd Jewell.

Robert Hamilton—was not burned nor bruised; the skin was slipping from decomposition.

[Signed] Sam Donaldson.

Sworn to and subscribed before me this January 7, 1896.

F. P. Clute, *Commissioner.*

P. F. LYNCH'S DEPOSITION.

Q. What is your name and age?

A. P. F. Lynch; age, 32 years.

Q. What is your occupation?

A. Mine foreman of New Richland Mines at present.

Q. Where were you on the morning of December 20, 1895, at time of explosion in the Nelson Mine, at Dayton, Tenn.?

A. I was at home, about one-half mile from mines.

Q. Did you go in the Nelson Mine that day, and if so, please give particulars concerning your work in that connection?

A. I went to Nelson mine about 11:30 a. m.; I volunteered my services, finding they were short of men, and got on the trip and went to No. 9 siding; then I met Geo. Gibson, who was gas inspector, and he complained that he was unable to do anything more from the effects of after-damp; he turned over the lamps to me, and he warned me that I would have to be very careful or I would walk into the after-damp; we organized a party, I taking the lead; each man had instructions to keep a few paces behind the other, so as to assist any man that got down; we proceeded very carefully, John L. McMillin acting as guide; we went over the falls to the little side track at junction of L and K, and the first body we found was Charles Washburne (so I learned afterward); he was lying near the first frog of the above side track; we made an examination and saw some more bodies lying near by; then returned and carried Washburne's body over the falls, and sent him out, and called for assistance to carry the others out; while they were gone we made another examination; we found, near by where Washburne was found, the bodies of Wm. Brotherton and Liney Walker; then we started down Alexander's room, and we found the bodies of Wm. Alexander and his laborer; they were lying about 40 or 50 feet from entry L; then we returned and went up empty siding and found the bodies of James Johnson and John Able; Johnson's body was doubled around a prop, and Able was partially covered with rubbish; then we retreated and made a careful examination of No. 1 room, but found no bodies or gas, but after-damp was strong and hot; we collected all the bodies beyond the fall, and waited for assistance; after the arrival of assistance we carried the bodies to the trip and all came out; I returned to the mine with a new crew, taking S. L. Umbarger as gas inspector; we made a thorough examination of D, where Hawkins was found, but found no gas there; then we went back to little side-track at junction of L and K, and at end of side-track found a heavy fall, which barred our advance; after consulting with Umbarger, we tried to reach the other side of the fall by the way of G, but found that we could not get through, so we returned to outside and reported that further advance was impossible until some timbering and cleaning up was done; then we recruited up our force, Umbarger remaining outside, and went back to same side-track at the larger fall; in preparing to set a timber one of the Collins boys discovered a man's foot, which proved to be, on removing the large rock covering the body, Josh Bennett's; we removed him to near the place we laid out other bodies; we came out and reported, and his body was taken out afterward.

Q. In your opinion, after examining the burnt district in No. 10, where was the origin of the explosion?

A. In my opinion, it was somewhere very close to the side-track at junction of K and L.

[Signed] P. F. LYNCH.

Sworn to and subscribed before me this January 6, 1896.

F. P. CLUTE, *Commissioner*.

J. G. THOMISON'S DEPOSITION.

Q. What is your name and occupation?

A. J. G. Thomison; physician and surgeon.

Q. Did you examine any of the victims of the recent explosion in Nelson Mine, at Dayton, Tenn.; if so, who and to what extent were they burned or injured?

A. I examined Bob Jewell; he was not burned much, if any; I suppose he died from suffocation; Floyd Jewell was in about the same condition as Bob Jewell; I don't think he was burned any; Liney Walker had a superficial burn on the face—very slight; James Johnson was prepared for burial; I did not see anything but his face, which was red and looked like it was caused by a puff of hot wind; Sam Wilson—did not see any burn on him; Elder Morgan was not washed when I saw him; saw no burns except on his hands; his hair was not burned; John Able's face was red; burned from hot air, I suppose; Chas, Washburne was slightly burned on face and hands; that is, it was superficial; it was just through the epidermis, or first layer of skin; William Brotherton was prepared for burial and all I could see was his face, which was red, indicating a superficial burn; W. J. Miller was in same condition as Brotherton; John Leach (col.)—could not detect any burn on his person; John Westerfield was not burned; John Manis was not burned; died from suffocation; William H. Davis was not burned; died from suffocation; Norris Small was not burned; died from suffocation; Thomas Hawkins' face was not burned; he had a bruise on head; Robert Hamilton—could not discover any burns on his person; J. A. Ivester was dressed for burial; could not discover any burns; his head was badly mashed; Will Roddy was dressed for burial, but I did not see any burn or bruises on him.

Q. Have you treated any parties that were burned or bruised at time of the explosion?

A. Yes, sir; I treated Oscar Hawkins; he had superficial burns on face and hands and some bruises; he is not seriously injured.

Q. Did you notice any difference between the last men burned and the men burned here before by gas, either on person or clothes?

A. Yes, sir; the burns were more superficial than heretofore, as if they had been burned by a puff of hot air or by intense heat; their clothing was not burned as usual in gas burns.

[Signed] J. G. Thomison.

Sworn to and subscribed before me, this January 7, 1896.

F. P. Clute, *Commissioner.*

J. R. GILLESPIE'S DEPOSITION.

Q. What is your name and occupation?

A. J. R. Gillespie; physician and surgeon.

Q. Are you the physician for the Dayton Coal and Iron Co.?

A. Yes, sir.

Q. Did you examine any of the bodies of the victims of the explosion in the recent disaster in the Dayton Coal and Iron Co.'s Nelson Mine?

A. Yes, sir; I examined Elder Morgan; he was burned on the hands, arms and face—were superficial burns; also Will Alexander; his hair, face and hands were slightly burned; his right leg, below knee, was broken; John Able, Jim Johnson, Wm. Brotherton and Liney Walker were all burned slightly; I believe that Liney Walker had his right arm broken above the elbow; I am sure it was Liney Walker; I desire to add that Will Alexander's skull was broken, back part; I saw a man who was said to be —— Miller, Alexander's laborer; he was slightly burned; his hair, face and hands showed that; I saw John Manis, who I think died of suffocation, as he was not burned and had no marks of violence on his person—some slight post-mortem discolorations only; I saw Thomas Hawkins' body; he had a scalp wound above the right ear; he had a slight burn on the hands, and his hair was singed slightly; his face nor moustache showed any signs of burn; I saw J. A. Ivester; he had nothing about him to indicate that he was burned; his head was crushed or mashed in; Will Roddy (col.) had a slight mark on his upper lip; evidently died of suffocation; he was not burned.

Q. Did you see their clothes, and were they burned?

A. I saw their clothing; some were slightly scorched; some of their clothing showed no signs of burn; in a regular gas explosion the clothes are usually noticeably burned; I examined Lon Ferguson; his face looked like it was baked from intense heat; no appearance of a burn; I saw Thomas Lane and Willie Lane; Thomas Lane's face had a baked or crystal appearance; his head was mashed in at back; his hair was not burned; Willie had every appearance of being burned; his hair was scinged; his body was not burned as far as I noticed; I saw Charles Washburn; he was burned about the face, head and hair; he had a broken arm; I examined Wm. Henderson; no limbs broken; he had some slight bruises; didn't appear to be burned, except he had a congested appearance about his face, like a hot oven bake; I examined a man said to be Williams, Bennett's laborer; he was burned considerably about the hands, head and face.

Q. Have you treated gas burns in course of your practice, and do you think these burns were from gas?

A. Yes, I have treated burns from gas; these burns were mostly 1st degree, i. e., they were superficial; Williams' burns seemed to be more severe than any of the others.

[Signed] J. R. GILLESPIE, M. D.

Sworn to and subscribed before me, this Jan. 7, 1896.

F. P. CLUTE, *Commissioner.*

S. H. PEARCY'S DEPOSITION.

Q. What is your name and occupation?

A. S. H. Pearcy; undertaker; residence, Dayton, Tenn.

Q. Did you dress and prepare for burial any of the victims of the recent mine explosion in the Nelson Mine at Dayton, Tennessee? If so, who were they, and what were their conditions?

A. John Able—I dressed him for burial; he was mangled; I don't think his neck was broken; one leg was broken in at least two or three places. Liney Walker—I don't remember his exact condition. Chas. Washburne—I prepared him for burial and embalmed him; he was burned on face, hands and breast, and probaby in some other places. G. W. Brotherton—I prepared him for burial; cannot recall his condition. W. J. Miller—I prepared him for burial; his head was badly cut up, and I think one arm was broken. Wm. Henderson—I prepared for burial; he was badly mangled about the face and head, also about his body; his skull was broken; I think he was burned about the face; I am not sure. John Manis—I don't remember that he was burned or mangled at all. W. J. Alexander—He was disfigured some; I don't recall in what manner. Thos. Hawkins—I prepared for burial; he had a cut on side of head; he was not burned. Cyrus Alexander—I prepared him for burial; he was partially decomposed when brought to my place of business; I think he was scorched from the heat. J. A. Ivester—I prepared for burial; his head was mashed flat; his body otherwise was intact; he was not burnrd. Will Roddy (col.)—He was not injured, bruised nor burned. James Johnson—I prepared him for burial; he had a skin burn about face and hands, I think. W. H. Davis—I prepared him for burial; he was not disfigured in any manner.

[Signed] S. H. PEARCY.

Sworn and subscribed to before me, this Jan. 8, 1896.

F. P. CLUTE, *Commissioner.*

W. F. THOMISON'S DEPOSITION.

Q. What is your name and occupation?

A. W. F. Thomison; physician and surgeon.

Q. Did you examine any of the victims of the recent explosion in the Nelson Mine at Dayton, Tenn.; if so, please state the names and condition of those you examined?

A. I saw John Manis after he was dressed for burial; I did not notice any burn on his face; his face was swollen some. Also, saw J. W. Miller; he was dressed for burial; he was in about same condition as Manis; I saw no burns. I examined Cyrus Alexander; his clothing, face and hair were not burned; one hand was bruised. The same remarks as to their condition, excepting their hands, will apply to Robert Jewell and Floyd Jewell, and they were not burned about clothing or person, that I could see. I examined Robt. Hamilton, and found no burns about him.

Q. Did you examine the burns on the person of Oscar Hawkins?

A. Yes, sir; his face and hands were very superficially burned; he had two slight injuries of the scalp; his hands were slightly bruised.

Q. Are the burns you have examined from the recent explosion similar to the gas burns you have treated heretofore?

A. No, sir, they are not; these burns are not as deep as the gas burns that I have treated heretofore, and the clothing does not show signs of any burns.

[Signed] W. F. THOMISON.

Sworn to and subscribed before me, this Jan. 7, 1895.

F. P. CLUTE, *Commissioner.*

JOHN HARNEY'S DEPOSITION.

Q. What is your name and age?

A. John Harney; age, 26.

Q. How long have you worked in Nelson Mine at Dayton, Tenn.?

A. About six months as day laborer.

Q. Did you work in No. 2 room, Bennett's place, the night before the explosion on morning of Dec. 20, 1895, and were you aware that there was gas in the room?

A. Yes, sir; I worked in that room.

Q. Who worked with you, and who told you there was gas in the room?

A. George Henderson worked with me, and Mr. Holden and S. L. Umbarger told me there was gas in the room; they cautioned me not to go in the face of the room.

Q. Do you know how much gas there was in the room?

A. No, sir.

Q. How near to the face of the room did you work?

A. I guess it was about 25 or 30 feet; I left before Umbarger made his morning rounds.

[Signed] JOHN HARNEY.

Sworn to and subscribed before me this January 8, 1896.

F. P. CTUTE, *Commissioner.*

OSCAR HAWKINS' DEPOSITION.

Q. What is your name and age?

A. Oscar Hawkins; age, 22 years.

Q. How long have you worked in the Nelson Mine, at Dayton Tenn.?

A. About six or eight months.

Q. Where were you at time of explosion, December 20, 1895; who was with you, and what occurred as far as you can remember?

A. I was on entry D, going in direction of side-track; I was driving; I was sitting in my car, opposite the haul-way from No. 10, when the wind struck me; I was blown out of my car, and only remember being with Ed. Blackford, who assisted me to No. 7 side-track; I don't remember anything else that occurred; I did not see any fire; I was using a safety lamp.

[Signed] **Oscar Hawkins.**

Attest: **A. J. Holden, J. C. Blackford.**

Sworn to and subscribed before me this January 8, 1896.

F. P. Clute, *Commissioner*.

GEORGE HENDERSON'S DEPOSITION.

Q. What is your name and age?

A. George Henderson; age, 24.

Q. Have you been working in the Nelson Mine at Dayton, Tenn., and in what capacity and how long?

A. Yes, sir; I have worked there about four years; I have been a fanner, but part of my duty was to accompany the fire-boss on his rounds of inspection, to assist him in case of accident or other necessity.

Q. Where did you work on the night previous to explosion, December 20, 1895, and what were you doing?

A. I loaded slate in Bennett's room, off from entry K, with John Harney.

Q. Was there any gas in that room?

A. If there was any gas I could not tell it; we worked within 20 feet of face all night with naked lights.

Q. Where did you meet S. L. Umbarger; about how much gas did he say there was in the room?

A. He came into Bennett's place and tested for gas; he went to the face of the room; I quit work to accompany Umbarger.

Q. Did you see Umbarger mark a danger line, and how did he mark it, and where did he put it in Bennett's room?

A. Yes, sir; I saw him mark a shovel and put it on the track; I did not see him mark a stick of wood; he placed the shovel somewhere near the entrance to the room, but I cannot say at what point.

Q. Have you been with Mr. Umbarger often, and has he shown care in marking his danger marks?

A. Yes, sir; I have been with him about two years, and he has always been very careful; he has often told me to be careful, not to get burned myself, and to keep anyone else from being burned he has always shown great care in making his danger marks.

his
[Signed] GEORGE + HENDERSON.
mark

Attest: J. A. McDONOUGH.

Sworn to and subscribed before me this January 8, 1896.

F. P. CLUTE, *Commissioner.*

J. T. MCINTIRE'S (COL.) DEPOSITION.

Q. What is your name and occupation?

A. J. T. McIntire (col.); age, 31 years.

Q. What is your occupation, and how long have you worked in the Nelson Mine, at Dayton, Tenn.?

A. Miner; I think it is 8 years the 5th of last September.

Q. What part of the mines were you working in Dec, 20, 1895, at time of explosion?

A. On entry called No. 7 where 7 and 9 had been connected; I was on side track at time of explosion; my work at the time was driving from the above side track into the works.

Q. State what occurred at time of explosion and whether you saw any fire.

A. I did not see any fire; I felt the wind blowing and I laid down and covered up my face; I heard the doors as they blew open and came to.

Q. Did you assist any of the miners or men from No. 9 district to outside—if so, who?

A. Yes, sir; I met Tommy Henderson, a trapper, about 50 feet below side track, when I went after a safety lamp; I instructed him how to reach side track and told him to remain there; then I went after others and met the lamp man, Mr. Blackford, and told him to go to side track and await my return; I met Done Davis about 300 feet below side track; I came back a little piece with him and told him to stay at side track; I then tried to reach Thomas Hawkins, but was driven back by after-damp.

Q. Did Done Davis complain of being burned?

A. I don't remember exactly; he said he was hurt and I believe he said he was burned.

Q. Where did you meet Oscar Hawkins?

A. I met him about 350 feet below side track.

Q. Was he burned or injured?

A. I asked him what was the matter, and he said he was burned.

Q. Were you with Mr. Will Head in the party that rescued the bodies through Dixon slope?

A. Yes, sir; we found them, but the air was so hot that we had to leave; we found the three first bodies in the dip room, district 10.

Q. Who were these three bodies?

A. John Westfield (col.), Sam Wilson (col.), and a colored man from Savannah, Ga.

Q. Do you know the number of the district that these three men worked in?

A. They worked in No. 10 district.

Q. Did you see any evidence of fire while in dip room?

A. No, sir.

[Signed] J. T. McIntire.

Sworn to and subscribed before me, this Jan. 4, 1896.

F. P. Clute, *Commissioner*.

J. T. MCANTIRE RE-EXAMINED.

Q. Do you know anything about the condition of the brattices and doors in Nos. 7, 9 and 10 districts previous to explosion, and if so what was their condition?

A. I know but little about 10; I had not been down there for several months, but the doors and brattices in 7 and 9 were in good condition.

Q. Was the air in Nos. 7 and 9 reasonably good before my inspection in September?

A. Yes, sir.

[Signed] JOHN McINTIRE.

Sworn to and subscribed before me, this Jan. 8, 1896.

F. P. CLUTE, *Commissioner.*

S. E. JEWELL RE-EXAMINED.

Q. With the exception of doors at No. 1 room, on entry P 1, and door on No. 7 room above P 1, were other doors and brattices safe and in good repair?

A. Yes, sir.

Q. Do you refer to all others throughout Nelson Mine?

A. No, sir; I refer to Nos. 9 and 10 districts.

[Signed] SODDY JEWELL.

Sworn to and subscribed before me this January 8, 1896.

F. P. CLUTE, *Commissioner.*

CORONER'S INQUEST OVER WM. RODDY (COL.), AT DAYTON, RHEA COUNTY, TENN., JAN. 7, 1896.

First witness—W. K. Gibson, being duly sworn, deposeth as follows: "I am superintendent of the mines for the Dayton Coal & Iron Company. There was an explosion at our mines; I think it was a dust explosion; there were some people killed at that explosion, in which Wm. Roddy (col.), was killed; I think H. B. Williams was the cause of the explosion, by carelessness; Roddy was buried on Sunday, I understand; H. B. Williams was a laborer—just a miner—was not superior in position; Williams was working with Josh Bennett; we found Roddy lying on his back across entry P 1, immediately under place where an over-cast or bridge had been; the fallen timbers being under him, his head towards the air-course; I think he was blown back by the force of the explosion and stunned, and never recovered, the after-damp being too hot and strong; I think Mr. Williams set off the gas by his naked lamp, by crossing the danger line, which had been maked and indicated; I reside in Dayton, Rhea County, Tenn. "W. K. GIBSON."

Second witness—James Head, deposeth as follows: "I am mine boss at the Nelson Mine; I was at the mine when this explosion took place; I had not been in the mine that morning; I was in the mine the day before, in the afternoon, I think; the mine was in safe condition so far as I could tell by examining, or by the reports of the men who work under me, who report to me; my duty is to carry on the work of the mines, and to ascertain whether the mines are safe to work and are in proper shape to work; those men under me—gas men—report to me if they find anything wrong or unsafe, or any gas in the way; I was on the yard when the explosion took place; S. L. Umbarger, the man who had inspected the mine that morning, reported to me that the mines were in good shape and safe, and that he had crossed out room No. 2 on entry K, also No. 1 and No. 16 room off of same entry; also, stated that there was but very little gas in them; he could have brushed them out, but he did not want to take any chances, crossed them out, and left them for the gas inspector, A. J. Holden, to clear and make safe; I suppose it was something like an hour before the explosion that Umbarger had made the inspection; I think that Umbarger is a competent gas inspector; my opinion is, the death of Roddy was caused by that explosion; in my opinion, the explosion was caused by H. B. Williams, by crossing the danger line with an open lamp; the custom is, all men are under strict orders not to cross over the danger line until the inspector cleans the room out, or gives them permission, or a safety lamp; our way of making the danger mark is, to take a piece of plank, or something, and write the word gas, and make a cross; I live in Rhea County, Tenn., and am of lawful age. "JAS. HEAD."

Third witness—W. T. Head deposeth as follows: "I reside in Rhea County, Tenn.; my age is 25 years; there was a mine explosion in Nelson Mine on the 20th of December, 1895; I was one of the party that found Will Roddy; my brother was with me when we found him; Mr. Gibson came in a few minutes; I suppose the after-damp killed him from the explosion; I suppose the explosion was caused by some one setting off some gas; I don't think Roddy was burned any; we found Roddy on the 4th of January, about 6 p.m., 1896; we brought him out right away, about 9 o'clock. "W. T. Head."

Fourth Witness—F. P. Clute, State Mine Inspector, deposeth as follows: "I consider South Pittsburg my home; age, 42 years; I am Commissioner of Labor and Inspector of Mines for the State of Tennessee; I received notice of the mine explosion, by telegraph, about 11:52 a.m., on Dec. 20, 1895; I came on first train; left Nashville at 3:40 p.m.; I arrived here 7:16 a.m. on December 21; I found there had been an explosion, and went in the mine immediately, to the district 10; the present condition of that part of the mine is pretty bad, due to the explosion; the brattices are all down, and many falls, due to the explosion; I examined the mine the latter part of September, 1895; I consider I made a thorough investigation; I was about two days; I found the mine in fair condition, except some of the doors, and in district No. 7 there was some trouble in one air-way, that was promptly repaired; if it had not been repaired, it would not have caused the explosion; I was through entry K; I saw nothing wrong with that; I don't know that the explosion could have been avoided at all; I think the mine boss did his duty; from the best evidence of the directions of the force of the explosion and burn in the room indicated, room No. 2 on entry K is the point of origin; I was shown the place where Will Roddy was killed; it was not in entry K; in my opinion, the cause of the explosion was the firing of a small pocket of gas, which stirred dust, and which became ignited from the gas flame and spread all over district No. 10 and part of No. 9; I believe dust to be the principal agency of the explosion.

"F. P. Clute."

We, the jurors of inquest, whose names are hereto affixed, upon our oaths, do say, from the evidence we find before us: We find, first, the name of the deceasad to be Will Roddy (col.), about 18 years old, and that he came to his death by an explosion and after-damp in the Nelson Mine, Rhea County, Tenn., on the morning of

December 20, 1895, at about 7:30 o'clock. This Jan. 7, 1896.

T. H. Brown,
Foreman.
W. L. Lillard,
J. B. Holloman,
R. C. Knight,
J. N. Cooley,
T. J. Knight,
M. B. Hix.

I certify that the above is a true copy of the verdict rendered by the above jury.

S. H. Pearcy,
Coroner for Rhea County, Tenn.

CORONER'S INQUEST OVER J. A. IVESTER, AT DAYTON, TENN.

First witness—W. K. Gibson; residence, Dayton, Tenn.; age 29; occupation, mine superintendent and civil engineer of the Dayton Coal & Iron Company; I was one of the party that found the man supposed to be J. A. Ivester; he was found in about three feet of Will Roddy's body; I think Ivester was stunned the same way as Will Roddy; a large rock afterwards fell upon his head; if the rock had not have fallen he could not have recovered, in my judgment, owing to the after-damp. W. K. Gibson.

Second witness—James Head; residence, Glasgow, Tenn.; age, 28; married; I am mine boss at the Nelson Mines; I was present when the body was found, supposed to be J. A. Ivester; Ivester was driving an entry near the place where he was found, about three feet of Roddy; he was taken out immediately; Ivester's head and breast were covered by a rock weighing something like 200 pounds; if the rock had not struck him, I am satisfied he could not have gotten out; the after-damp would have been too much for him; I think the explosion killed him the same as Will Roddy, on the day of December 20, about 7:30 a.m., 1895.

James Head.

We, the jurors of inquest, whose names are hereto affixed, upon our oaths, do say, from the evidence before us: We find, first, the name of the deceased to be J. A. Ivester, about 39 years of age, and that he came to his death by an explosion and after-damp i the Nelson Mine, Rhea County, Tenn., on the morning of December 20, 1895, about 7:30 o'clock. This Jan. 7, 1896.

T. H. Brown,
Foreman.
W. L. Lillard,
J. B. Holloman,
R. C. Knight,
J. M. Cooley,
T. J. Knight,
M. B. Hix.

I certify that the above is a true copy of the verdict rendered by the above jurors.

S. H. Pearcy,
Coroner for Rhea County, Tenn.

THE MANUFACTURE OF COKE.

The Tennessee coal field is a part of the great Appalachian field. Beginning with a few patches of coal near the northern boundary of Pennsylvania, the great Appalachian coal field stretches for a distance of over 750 miles in a southwesterly direction to Tuscaloosa, Alabama, where it is lost. This is at present, and promises to be in the future, the most important coal field in America. It has an average breadth of from 80 to 90 miles, and an area of fully 65,000 square miles. The eastern escarpment of the Alleghany Mountains forms the eastern border of this basin, while the Cincinnati anticlinal hems it on the west and separates it from the measures of the Illinois basin. The eastern line of this field is comparatively regular, following the trend of the mountains, but the western line is very irregular, being quite broad in its northern area, contracting through Tennessee and northern Alabama, and expanding at its termination in Alabama, though it is here by no means so broad as in Pennsylvania, Ohio and West Virginia.

Along nearly the entire length of this great coal field, from Blossburg, Pa., to Birmingham, Ala., the coking industry has been established. The ovens, following the zone of best coking coal, are generally found near the eastern limits of the field, the coal in the middle or western part of the basin being, as a rule, not so well adapted to coking by methods at present as that of the eastern. While the coal all through this basin is usually a coking coal, as pointed out by Rogers many years ago, these coals increase in bituminous matter as they go westward, so that the coal of the Pittsburg seam, which, in Cumberland, has only some 18 per cent. volatile matter, contains 30 per cent. in the Connellsville region, 32 to 33 per cent. in Pittsburg, and and 35 to 38 and even 40 per cent. in Ohio. The veins also thin out as they go westwardly, which makes the mining more expensive. Referring to the example already given, the Pittsburg vein, which is the big vein at Cumberland, is sometimes 14 feet; in Connellsville, 9 feet; in Pittsburg, 5 to 6 feet, and in Ohio from 2½ to 4 feet. Where the veins are thin the percentage of ash, and especially the percentage of sulphur, is apt to be much higher than in the thicker vein. For all of these reasons, as stated above, the coals in the middle and western part of the Apalachian basin, as a rule, are not so good as those closer to the mountains.

The importance of the Apalachian field as a coke producer is indicated not only by the large per centage of coke produced in the United States, which comes from the coal measures of this field, but from the fact that in it are found the Connellsville, Pa., the New River, Va., the Pocahontas Flat Top, Virginia and West Virginia, the Sewanee, Tenn., and the Birmingham, Ala., coal fields, together with other important fields.

CONDITIONS IN WHICH COAL IS USED.

As a rule, good coking coals are exceedingly friable, but a small proportion of lumps is produced in mining, though even the lumps rapidly crumble on exposure to the air. Notable examples of these are the Connellsville and Flat Top coals. The Connellsville coal is so valuable for coke, and there is so much other coal in its immediate vicinity that will stand transportation, that it is hardly mined at all for any purpose than coke making. A few thousand tons a year, outside of that used locally at the mines and in the houses of the operators, will cover the total production of the Connellsville region for domestic and steam or heating purposes. The result is that all of the coal, as it comes from the mine, or "run of the mine," as it is termed, is coked in the Connellsville region. On the other hand, there is a very good demand for Pocahontas or Flat Top coal for steam or heating purposes, it being one of the best steam coals in the world. As consumers prefer this coal in lumps, a great deal of the coal mined in the Pocahontas Flat Top region is screened, and the slack from these screenings, mixed to a greater or less extent with run of mine, is coked.

In many parts of the United States in which coking is carried on, and especially in those districts in which coking is not an extensive industry, coke is made chiefly for the purpose of utilizing this slack or fine coal which results from the mining and preparation of coal for steam, household, and other purposes of the general market. Practically all of the coal used in coking in Georgia, Illinois, Indiana, Indian Territory, Kansas, Missouri, and Washington is of this character, while a large proportion of that from Colorado, Kentucky, Montana, Ohio, Tennessee, Virginia, and West Virginia is also slack coal. Even in Pennsylvania a considerable portion of the coal used is screenings or slack produced in mining. Of the 14,337,937 tons of coal used in coking in the United States in 1894, 4,294,734 tons, or about 30 per cent. was slack or screenings. It is this use of slack which makes it so difficult at times to ascertain just how much coal has been used to produce a given quantity of coke. The coal is regarded as having no value; it is not weighed when charged to the oven, and there is no way to ascertain the actual amount of coal charged; it can only be estimated.

It is also true that coke makers using coal somewhat high in ash, and even pure coals low in volatile matter, are gradually learning of the great importance of thoroughly comminuting the coal before using. Quite a number of machines, mostly on the principle of the old Carr disintegrator, are erected for the purpose of disintegrating or finely dividing the coal and making it somewhat homogeneous, both in size of pieces and distribution of ash, before putting it into ovens. The effect of this disintegration is chiefly to disseminate the ash (which exists in the coal largely as slate) thoroughly through the coal mass, instead of permitting it to go into the oven in the form of slate, in which condition it not only interferes with the coking process, especially the rising of the gas through the mass of the coal, but it remains in the resultant coke in such a condition as to require a much larger amount of heat and lime to flux it out if the coke is to be used as a blast-furnace fuel.

OVENS USED IN THE UNITED STATES.

It still holds true that the solid wall oven, or, as it may be termed, the "open retort," usually of the beehive form, is practically the only one yet used in this country. Some closed retort ovens of the Belgian type exist in Pennsylvania, and a few retorts, which may be regarded as by-product coke-ovens, were used in Colorado and West Virginia. There is also a block of by-product retort ovens on the Semet-Solvay principle in operation at Syracuse, N. Y., near the Solvay Soda Ash Works, the design of these ovens being chiefly to collect ammonia from the gasses that pass off for use in the

Solvay or ammonia process of soda-making. Somewhat similar ovens or retorts, on the Huessener principle, have been erected at Winifrede, W. Va. These ovens have been erected chiefly for the recovery of the by-products from the slack coal, which is produced in large quantities, the coke being used for domestic purposes. Accompanying these ovens, in addition to the ordinary tar and ammonia plants, is a Slocum benzole plant. There is also a bench of retorts, built on the Huessener coke-oven principle, in operation in Colorado.

Considerable attention has been given during the years of 1894 and 1895 to the erection in the United States of coke ovens for the saving of by-products. The ovens are close retorts, into the coking chamber of which no air is admitted, the gases being removed by hydraulic mains, and after being deprived of their tar, ammonia, and, in some cases, benzole, are returned to the ovens and burned in the flues, under the bottom, and in the side-walls of the ovens, in connection with air. The usual dimensions of these ovens vary somewhat with the style, being from 25 to 33 feet long, 14 to 26 inches wide, and 6 to 7 feet high, taking a charge of from 4 to 8 short tons of coal, and coking the coal in from 18 to 48 hours. The length of the coking time depends somewhat on the character of the coal, but more especially on the width of the oven and the thickness or thinness of the wall between the flues and coking chamber. The yield of by-products depends chiefly upon the coal, the tightness of the oven, the heat at which the oven is operated, and the character of the by-product plant. It can be said in a general way, however, that from Connellsville coal, for example, from 1 to 1.2 per cent. of sulphate of ammonia can be procured from a ton of coal from 3 to 3½ per cent. of tar, and from three-fourths of 1 per cent. to 1¼ per cent. of benzole. There is also a portion, varying somewhat with the coal, of excess gas—the gas more than is needed for the coking of coal. This will vary from 25 to 50 per cent., say, with Connellsville coal, 4,000 to 5,000 cubic feet excess gas. At most of the coke works in Europe the waste heat, or heat as it comes from the flues after having done its work, is passed under boilers for raising steam. The amount of water evaporated by this waste heat per ton of coal charged will vary from one-half ton to one ton.

These by-product ovens can be broadly divided into two classes:

1. Those in which the flues in the side walls are horizontal. There are usually three flues in the side walls of these ovens; the gas passes first into the upper flue, passes along the entire length, passes down into the middle flue, passes its entire length and into the third or bottom flue, and then passes out of the flue. These flues are usually the same length as the coking chamber. The ovens of this type are known as Carves, Huessener or Huessener-Carves, and the Semet-Solvay. In some of these horizontal-flue ovens the air is heated by recuperators before mixing with the gas and burning; in others, not.

2. The vertical-flue oven, in which the flues in the side walls are divided into two pairs, consist of 16 vertical flues each, or 32 flues to a side. The burning gases passing into the coking chamber underneath the first pair of 16 flues, distribute themselves through the 16 flues, pass up the side of the oven, meeting in the top, pass over and down through the second pair of flues, and out of the oven. There is but one type of vertical flue oven in use, which is known as the Otto-Hoffman, but should be more properly styled the Otto-Hoffman-Coppee, the vertical flue being a characteristic of the retort oven, on which some improvements were made by Dr. C. Otto, and to which Mr. Hoffman added a Siemen's regenerator for preheating the air. The essential feature of the Otto-Hoffman oven is that it is a vertical-flue oven, with preheating of the air by a Siemen's regenerator.

There are some 3,000 of these ovens in operation in Europe, especially in Westphalia, Germany; Mons. district, Belgium, and Durham district, England. They are making a coke that is a perfectly satisfactory metallurgical fuel, either for blast furnaces or foundries; indeed, the foundry coke made by these by-product ovens commands a higher price than the coke made from the same coal in beehive ovens. A bank of 60 Otto-Hoffman ovens is being erected in this country, at Johnstown, by the Cambria Iron Company; a set of 50 Semet-Solvay ovens is being built at Dunbar to use Connellsville coal; also, plans are being considered for 3 sets of by-product ovens near Pittsburg, two of which will probably be Slocum "full-depth" ovens, which are modified Carves-Huessener ovens, with thin walls and narrow coking chamber, and the third probably on the Huessener principle, the chief feature of which, in contradistinction from the others, is auxiliary firing, or the introduction into the flues at given points of additional gas to maintain the heat of the flues and the use of the air without preliminary heating.

PROCUCTION OF COKE IN THE UNITED STATES.

In the following table will be found a statement of the production of coke in the United States, by States, followed, for purpose of comparison, by similar tables for 1892 and 1893.

MANUFACTURE OF COKE IN THE UNITED STATES, BY STATES AND TERRITORIES, IN 1894.

STATES AND TERRITORIES.	No. Establishments.	OVENS.		Coal Used. (Short Tons.)	Yield of Coal in Coke. (Per Cen.t)	Coke Produced. (Short Tons.)	TOTAL VALUE OF COKE.	Value of Coke per ton.
		Built.	Building.					
Alabama	22	5,551	50	1,574,245	58.70	923,817	$ 1,871,348	$ 2.025
Colorado (a)	8	(b)1,154	250	542,429	58.50	317,196	903,970	2.85
Georgia	1	338	......	166,523	55.90	93,029	116,286	1.25
Illinois	1	24	......	3,800	57.90	2,200	4,400	2.00
Indiana	2	94	......	13,489	48.06	6,551	13,102	2.00
Indian Territory	1	80	.....	7,274	42.00	3,051	10,693	3.50
Kansas	6	61	......	13,288	63.50	8,439	15,660	1.855
Kentucky	6	293	......	66,418	44.80	29,748	51,566	1.73
Missouri	3	10	......	3,442	65.40	2,250	3,563	1.58
Montana	2	153	......	22,500	44.40	10.000	110,000	11.00
New Mexico	1	50	.....	13,042	50.00	6,529	28,213	4.32
Ohio	8	363	.....	55,324	59.00	32,640	90,875	2,78
Pennsylvania	101	25,824	118	9,059,118	66.90	6,063,777	6,585,489	1.086
Tennessee	11	1,860	......	516,802	56.60	292,646	480,124	1.64
Utah	1	83	......	....	....	(c) 16,056	....	....
Virginia	2	736	100	280,524	64.20	180,091	295,747	1.64
Washington	3	84	......	8,563	61.20	5,245	18,249	3.48
West Virginia	78	7,858	60	1,976,128	60.40	1,193,933	1,639,687	1.378
Wisconsin	1	120	......	6,343	67.00	4,250	19,465	4.58
Wyoming	1	24	......	8,685	50.00	4,352	15,232	3.50
Total	259	44,760	578	14,337,937	64.00	9,179,744	12,273,669	1.337
New York	1	12	13	....	....	16,500	....	....
	260	44,772	591	14,337,937	....	9,196,244	....	....

(a) Includes Utah's production of coal and coke and value of same. (b) Includes 36 gas retorts. (c) Included with Colorado's coke production.

From this table it appears that the total production of coke in the United States in 1894 was 9,196,244 tons, as compared with 9,478,580 tons in 1893 and 12,010,829 tons in 1892. The production of 1894 is the smallest in the history of coking in the United States since 1888. This great falling off is due to the depression in the iron business, and chiefly to the falling off in the production of pig iron, in the manufacture of which is consumed by far the largest proportion of the coke made in the United States. In 1894 the total production of pig iron, smelted with coke exclusively, or with a mixture of coke and anthracite, was 6,314,891 tons, as compared with 6,687,830 tons in 1893, and 8,390,359 tons in 1892. This is a reduction in round numbers of 363,000 tons as compared with 1893, and 2,000,000 tons as compared with 1892. The falling off in coke production was 281,336 tons in 1893, as compared with 1894, and 2,814,585 tons, as compared with 1892. It will be seen from this, therefore, that the falling off in production of coke is very nearly accounted for in the falling off in the production of pig iron.

MANUFACTURE OF COKE IN THE UNITED STATES, BY STATES AND TERRITORIES, IN 1893.

STATES AND TERRITORIES.	No. Establishments.	OVENS.		Coal Used. (Short Tons.)	Yield of Coal in Coke. (Per Cent.)	Coke Produced. (Short Tons).	TOTAL VALUE OF COKE.	Value of Coke per Ton.
		Built.	Building.					
Alabama	23	5,548	60	2,015,398	58.0	1,168,085	$ 2,648,632	$ 2.27
Colorado (a)	8	(b)1,154	200	628,935	57.7	362,986	1,137,488	3.13
Georgia	1	338	......	171,645	52.8	90,726	136,089	1.50
Illinois	1	24	......	3,300	66.7	2,200	4,400	2.00
Indiana	2	94	......	11,549	49.6	5,724	9,048	1.58
Indian Territory	1	80	......	15,118	47.0	7,135	25,072	3.51
Kansas	6	75	......	13,645	62.8	8,565	18,640	2.18
Kentucky	4	283	100	97,212	50.0	48,619	97,350	2.00
Missouri	3	10	......	8,875	66.5	5,905	9,735	1.65
Montana	2	153	......	61,770	48.5	29,945	239,560	8.00
New Mexico	1	50	......	14,698	39.5	5,803	18,476	3.18
New York	1	12	......	15,150	84.8	12,850	35,925	2.80
Ohio	9	435	......	42,963	52.0	22,436	43,671	1.95
Pennsylvania	102	25,744	19	9,386,702	66.0	6,229,051	9,468,036	1.52
Tennessee	11	1,942	......	449,511	59.0	265,777	491,523	1.85
Utah	1	83	......	....	....	(c) 16,005	....	....
Virginia	2	594	206	194,059	64.5	125,092	282,896	2.26
Washington	3	84	......	11,374	59.0	6,731	34,207	5.08
West Virginia	75	7,354	132	1,745,757	60.8	1,062,076	1,716,907	1.62
Wisconsin	1	120	......	24,085	62.0	14,958	95,851	6.41
Wyoming	1	24	......	5,400	54.0	2,916	10,206	3.50
Total	258	44,201	717	14,917,146	63.5	9,477,580	$ 16,523,714	$ 1.74

(a) Includes Utah's production of coal and coke and value of same. (b) Includes 36 gas retorts. (c) Included with Colorado's coke production.

MANUFACTURE OF COKE IN THE UNITED STATES, BY STATES AND TERRITORIES, IN 1892.

STATES AND TERRITORIES.	No. Establishments.	OVENS.		Coal Used. (Short Tons.)	Yield of Coal in Coke. (Per Cent.)	Coke Produced. (Short Tons.)	TOTAL VALUE OF COKE.	Value of Coke per Ton.
		Built.	Building.					
Alabama	20	5,320	90	2,585,966	58.0	1,501,571	$ 3,464,623	$ 2.31
Colorado (a)	9	(b) 1,128	220	599,200	62.3	373,229	1,234,320	3.31
Georgia	1	300	......	158,978	51.5	81,807	163,614	2.00
Illinois	1	24	......	4,800	66.0	3,170	7,133	2.25
Indiana	2	84	......	6,456	49.7	3,207	6,472	2.02
Indian Territory	1	80	......	7,188	50.0	3,569	12,402	3.47
Kansas	6	70	......	15,437	59.2	9,132	19,906	2.18
Kentucky	5	287	100	70,783	51.0	36,123	72,563	2.01
Missouri	3	10	......	11,088	65.8	7,299	10,949	1.50
Montana	2	153	......	64,412	53.6	34,557	311,013	9.00
New Mexico	1	50	......	......	......	......	......	......
Ohio	10	436	......	95,236	54.4	51,818	112,907	2,18
Pennsylvania	109	25,366	269	12,591,345	66.1	8,327,612	15,015,336	1.80
Tennessee	11	1,941	......	600,126	59.0	354,096	724,106	2.05
Utah	1	83	......	......	......	(c) 7,309	......	......
Virginia	2	594	206	226,517	65.3	147,912	322,486	2.18
Washington	3	84	30	12,372	58.0	7,177	50,446	7.03
West Virginia	72	5,843	978	1,709,183	60.5	1,034,750	1,821,965	1.76
Wisconsin	1	120	......	54,300	62.2	33,800	185,900	5.50
Wyoming	1	24	......	......	......	......	......	......
Total	261	42,002	1893	18,813,337	64.0	12,010,829	$ 23,536,141	$ 1.96

(a) Includes Utah's production of coal and coke and value of same. (b) Includes 36 gas retorts. (c) Included with Colorado's coke production.

It will be noted that Pennsylvania still maintains its supremacy as the chief coke-producing State, its production in 1894 being 6,063,777 tons out of a total of 9,196,244 tons, or 65.9 per cent. In 1893 its production was 65.7 per cent., and in 1892, 69 per cent. It will be seen, therefore, that notwithstanding its falling off in production, chiefly in the Connellsville region, as a result of the great strike of some weeks' duration in that district in the early summer of 1894, Pennsylvania maintained its relative position as a coke-producing State. West Virginia, which in 1893 stood third as a coke-producing State, in 1894 became the second, producing 1,193,933 tons, or about 13 per cent., while Alabama, which was the second State in 1893, became third in 1894, producing but 923,817 tons, or 10.4 per cent. No other State produced as much as 500,000 tons. Colorado still maintains its position as the fourth State, producing 301,140 tons in 1894, or 3.3 per cent. Tennessee still follows Colorado closely, producing 292,646 tons, in 1894, or 3.2 per cent. Virginia produced 180,091 tons, or nearly 2 per cent. These six are the only States that produced over 100,000 tons of coke in 1894.

Comparing the tonnage of the States in 1893 and 1894, it will be seen that of six chief coke-producing States the production declined in Colorado, Alabama and Pennsylvania, but increased slightly in Tennessee, Virginia and West Virginia. The reduction in production in Alabama in 1894, as compared with 1893, was 244,268 tons, or about 21 per cent.; in Colorado 45,841 tons, or 13 per cent., and in Pennsylvania 165,274 tons, or nearly 3 per cent.; while the increased production in Tennessee was 26,869 tons, or 10 per cent.; in West Virginia 131,857 tons, or 12.4 per cent., and in Virginia 54,999 tons, or 44 per cent. There was also a slight increase in the production of Georgia and Ohio. The production of the other States is so small that no comparison need be made with previous years.

In the following table are consolidated the statistics of the manufacture of coke in the United States from 1880 to 1894, inclusive. In the column of "coke produced" in 1894 is included the coke produced in New York, but as there is but one works in New York, we have not included the amount of coal used, the total value of the coal, nor the value of the coke. The exclusion of New York, however, will not greatly alter either the average value of coke at ovens, the yield of coal in coke, or the average value per ton of coal.

STATISTICS OF THE MANUFACTURE OF COKE IN THE UNITED STATES, 1880 TO 1894, INCLUSIVE.

YEAR.	Establishments.	Ovens Built.	Ovens Building.	Coal Used. (Short Tons.)	Coke Produced. (Short Tons.)	Total Value of Coke at Ovens.	Value of Coke at Ovens per Ton.	Yield of Coal in Coke, per cent.
1880....	186	12,372	1,159	5,237,741	3,388,300	$ 6,631,267	$1 99	63.0
1881....	197	14,119	1,005	6,546,662	4,113,760	7,725,175	1 88	63.0
1882....	215	16,356	712	7,577,648	4,793,321	8,462,167	1 77	63.
1883....	231	18,304	407	8,516,670	5,464,721	8,121,607	1 49	64.
1884....	250	19,557	812	7,951,974	4,873,805	7,242,878	1 49	61.
1885....	233	20,116	432	8,071,126	5,106,696	7,629,118	1 49	63.
1886....	222	22,597	4,154	10,688,972	6,845,369	11,153,366	1 63	64.
1887....	270	26,001	3,584	11,859,752	7,611,705	15,321,116	2 01	64.
1888....	261	30,059	2,587	12,945,350	8,540,030	12,445,963	1 46	66.0
1889....	252	34,165	2,115	15,960,973	10,258,022	16,630,301	1 62	64.0
1890....	253	37,158	1,547	18,005,209	11,508,021	23,215,302	2 02	64.
1891....	243	40,245	911	16,344,540	10,352,688	20,393,216	1 97	63.
1892....	261	42,002	1,893	18,813,337	12,010,829	23,536,141	1 96	64.
1893....	258	44,201	717	14,917,146	9,477,580	16,523,714	1 74	63.5
1894....	260	44,772	591	(a)14,337,937	9,196,244	(a)12,273,669	1 337	64.

(a) Excluding New York.

TOTAL NUMBER OF COKE WORKS IN THE UNITED STATES.

The following table gives the number of establishments manufacturing coke in the United States at the close of each year from 1880 to 1894, by States:

States and Territories.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.
Alabama	4	4	5	6	8	11	14	15	18	19	20	21	20	23	22
Colorado	1	2	5	7	8	7	7	7	7	9	8	7	9	8	8
Georgia	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1
Illinois	6	6	7	7	9	9	9	8	8	4	4	1	1	1	1
Indiana	2	2	2	2	2	2	4	4	3	4	4	2	2	2	2
Indian Territory	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kansas	2	3	3	4	4	4	4	4	6	6	7	6	6	6	6
Kentucky	5	5	5	5	5	5	6	6	10	9	9	7	5	4	6
Missouri	....	....	....	....	....	....	....	1	1	3	3	3	3	3	3
Montana	....	....	....	1	3	2	4	2	1	2	2	2	2	2	2
New Mexico	....	....	2	2	2	2	2	1	1	2	2	1	1	1	1
New York	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
Ohio	15	15	16	18	19	13	15	15	15	13	13	9	10	9	8
Pennsylvania	124	132	137	140	145	133	108	151	120	109	106	109	109	102	101
Tennessee	6	6	8	11	13	12	12	11	11	12	11	11	11	11	11
Texas	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Utah	1	1	1	....	1	1	1	....	....	1	1	1	1	1	1
Virginia	....	....	....	....	1	1	2	2	2	2	2	2	2	2	2
Washington	....	....	....	....	1	1	1	1	3	1	2	2	3	3	3
West Virginia	18	19	22	24	27	27	29	39	52	53	55	55	72	75	78
Wisconsin	....	....	....	....	....	....	....	....	1	1	1	1	1	1	1
Wyoming	....	....	....	....	....	....	....	....	....	1	1	1	1	1	1
Total	186	197	215	231	250	233	222	270	261	253	253	243	261	258	260

The word "establishment" is rather an indefinite one. In some cases the proprietors of coke works owning several different banks or blocks of ovens will report them all as one establishment, they being under one general management. In other cases they will be reported separately. The number differs so much from year to year as to make the table of but of little value for comparison.

The number of establishments in the country for each year since 1850, for which there are any returns, is as follows:

YEARS.	NUMBER.	YEARS.	NUMBER.
1850 (census year)	4	1886, December 31	222
1860 (census year)	21	1887, December 31	270
1870 (census year)	25	1888, December 31	261
1880 (census year)	149	1889, December 31	253
1880, December 31	186	1890, December 31	253
1881, December 31	197	1891, December 31	243
1882, December 31	215	1892, December 31	261
1883, December 31	231	1893, December 31	258
1884, December 31	250	1894, December 31	260
1885, December 31	233		

NUMBER OF COKE OVENS IN THE UNITED STATES.

The following table shows the number of coke ovens in each State and Territory on December 31 of each year from 1880 to 1894, together with the total number of ovens in the United States at the close of each of these years. In the early years covered by this table some coke was made in pits and on the ground, and in testing the adaptability of certain coals to the manufacture of coke this is still customary, though in the latter years but little of the coke reported as produced in the United State was made in anything but ovens.

NUMBER OF COKE OVENS IN THE UNITED STATES ON DEC. 31 OF EACH OF THE YEARS FROM 1880 TO 1894.

STATES AND TERRITORIES.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.
Alabama	316	416	536	767	976	1,075	1,301	1,555	2,475	3,944	4,805	5,068	5,320	5,548	5,551
Colorado	200	267	344	352	405	434	483	532	602	834	916	948	(a) 1,128	(a) 1,154	(a) 1,154
Georgia	140	180	220	264	300	300	300	300	290	300	300	300	300	338	338
Illinios	176	176	304	316	325	320	335	278	221	149	148	25	24	24	24
Indiana	45	45	37	37	37	37	100	119	103	111	101	84	84	94	94
Indian Territory	20	20	20	20	20	40	40	80	80	78	78	80	80	80	80
Kansas	6	15	20	23	23	23	36	39	58	68	68	72	75	75	61
Kentucky	45	45	45	45	45	83	76	98	132	166	175	115	287	283	298
Missouri	....	....	....	....	....	....	....	4	4	9	10	10	10	10	10
Montana	....	....	....	2	5	2	16	27	40	90	140	140	153	153	153
New Mexico	....	....	....	12	70	70	70	70	70	70	70	(b).....	50	50	50
New York	....	....	....	....	....	....	....	....	....	....	....	....	....	(c) 12	(c) 12
Ohio	616	641	647	682	732	642	560	585	547	462	443	421	436	435	363
Pennsylvania	9,501	10,881	12,424	13,610	12,295	14,553	16,314	18,294	20,381	22,143	23,430	25,324	25,366	25,744	25,824
Tennessee	656	724	861	992	1,105	1,887	1,485	1,560	1,634	1,639	1,664	1,995	1,941	1,942	1,860
Utah	20	20	20	20	20	20	20	....	....	34	80	80	83	83	83
Virginia	....	....	....	200	200	200	350	350	550	550	550	550	594	594	736
Washington	....	....	....	....	....	2	11	30	30	30	30	80	84	84	84
West Virginia	631	689	878	962	1,005	978	1,100	2,080	2,792	3,438	4,060	4,621	5,848	7,854	7,858
Wisconsin	....	....	....	....	....	....	....	....	50	50	70	120	120	120	120
Wyoming	....	....	....	....	....	....	....	....	....	....	20	24	24	24	24
Total	12,372	14,119	16,356	18,304	19,557	20,116	22,597	26,001	30,059	34,165	37,158	40,057	42,002	44,201	44,772

(a) Includes thirty-six gas retorts. (b) Coke was made in pits. (c) Semet-Solvay ovens.

We have before commented on the kinds of coke ovens in use in the United States. As compared with 1893, the above table shows an increase of but 571 ovens in the United States in 1894. In Alabama there was an increase of 3 ovens; in Kentucky, 10; in Pennsylvania, 80; in Virginia, 142; in West Virginia, 504; while there was a decrease in Kansas of 14; in Ohio, 72, and in Tennessee, 82.

As we have noted in previous tables of this article, a calculation based upon this table and the one showing production indicates that the ovens in certain States were in much more active operation during the year than those in other States. For instance, Alabama had 5,551 ovens at the close of 1894, as compared with 7,858 ovens in West Virginia, and made only some 270,000 tons less than were made in West Virginia. The product per oven in West Virginia in 1894 was 152 tons; in Alabama, 166 tons, and in Pennsylvania, 235 tons. The product per oven in 1893 in these States was, in West Virginia, 144 tons, in Alabama, 211 tons, and in Pennsylvania, 242 tons.

As is elsewhere stated, most of the ovens in operation in the United States are of the solid-wall type, in which the coal is coked by heat generated in the oven itself, a certain amount of the heat generated at a burning being stored in the walls of the oven. Most of the ovens are of the regular beehive shape; a few are somewhat modified in form, the oven being long and shaped like a muffle. The principle of coking, howerer, is the same in these long ovens (which are sometimes called Welsh ovens or drag ovens), certain shapes used in this country being also known as the Thomas oven (from its inventor), as in the beehive; that is, the coking of the coal is by the heat generated by the combustion of the coal in the oven itself with such slight heat as may be stored in the walls of the oven from a previous burning.

We have also stated elsewhere that a bank of 12 by-product ovens on the Semet-Solvay principle has been in operation at Syracuse, N. Y., for the last two years, and a bank of retorts on the principle of the Huessener by-product coke ovens is in operation in West Virginia, and a somewhat similar bank in operation in Colorado, and that the construction of a bank of Otto-Hoffman ovens was begun in 1895 at Johnstown, Pa., and a bank of Semet-Solvay ovens at

Dunbar, Pa., while other sets of ovens on the Carves-Huessener and Slocum principles will probably be built in 1896 near Pittsburg. In addition to these flue ovens for the saving of by-products, there are some flue or retort ovens without the saving of by-products in operation in Pennsylvania, but they are of little account.

PRODUCTION OF COKE FROM 1880 TO 1894.

The production of Coke in the several States and Territories, from 1880 to 1894 is shown in the following table:

STATES AND TERRITORIES.	1880	1881	1882	1883	1884	1885	1886	1887
Alabama	60,781	190,033	152,940	217,531	244,009	301,180	375,054	325,020
Colorado	25,568	48,587	102,105	133,997	115,719	131,960	142,797	170,698
Georgia	38,041	41,376	46,602	67,012	79,268	70,669	82,680	79,241
Illinois	12,700	14,800	11,400	13,400	13,095	10,350	8,103	9,198
Indiana	....	....	....	....	....	....	6,124	17,658
Indian Territory	1,546	1,768	2,025	2,573	1,917	3,584	6,351	10,060
Kansas	3,070	5,670	6,080	8,430	7,190	8,050	12,493	14,950
Kentucky	4,250	4,370	4,070	5,025	2,223	2,704	4,528	14,565
Missouri	....	....	....	....	....	....	....	2,970
Montana	....	....	....	....	75	175	....	7,200
New Mexico	....	....	1,000	3,905	18,282	17,940	10,236	13,710
New York	....	....	....	....	....	....	....	....
Ohio	100,596	119,469	103,722	87,834	62,709	39,416	34,932	93,004
Pennsylvania	2,821,384	3,437,708	3,945,034	4,438,464	3,822,128	3,991,805	5,406,597	5,832,849
Tennessee	130,609	143,853	187,695	203,691	219,723	218,842	368,139	396,979
Utah	1,000	....	250	....	....	....	....	....
Virginia	....	....	....	25,340	63,600	49,139	122,352	166,947
Washington	....	....	....	....	400	311	825	14,625
West Virginia	138,755	187,126	230,398	257,519	223,472	260,571	264,158	442,031
Wisconsin	....	....	....	....	....	....	....	....
Wyoming	....	....	....	....	....	....	....	....
Total	3,338,300	4,113,760	4,793,321	5,464,721	4,873,805	5,106,696	6,845,369	7,611,705

STATES AND TERRITORIES.	1888.	1889.	1890.	1891.	1892.	1893.	1894.
Alabama	508,511	1,030,510	1,072,942	1,282,496	1,501,571	1,168,085	923,817
Colorado	179,682	187,638	245,756	277,074	365,920	346,981	301,140
Georgia	83,721	94,727	102,233	103,057	81,807	90,726	93,029
Illinois	7,410	11,583	5,000	5,200	3,170	2,200	2,200
Indiana	11,956	8,301	6,013	3,798	3,207	5,724	6,551
Indian Territory	7,502	6,639	6,639	9,464	3,569	7,135	3,051
Kansas	14,831	13,910	12,311	14,174	9,132	8,565	8,439
Kentucky	23,150	13,021	12,343	33,777	36,123	48,619	29,748
Missouri	2,600	5,275	6,136	6,872	7,299	5,905	2,250
Montana	12,000	14,043	14,427	29,009	34,557	29,945	10,000
New Mexico	8,540	3,460	2,050	2,300	....	5,803	6,529
New York	....	....	....	....	....	12,850	16,500
Ohio	67,194	75,124	74,633	38,718	51,818	22,436	32,640
Pennsylvania	6,545,779	7,659,055	8,560,245	6,954,846	8,327,612	6,229,051	6,063,777
Tennessee	385,693	359,710	348,728	364,318	354,096	265,777	292,646
Utah	....	761	8,528	7,949	7,309	16,005	16,056
Virginia	149,199	146,528	165,847	167,516	147,912	125,092	180,091
Washington	....	3,841	5,837	6,000	7,177	6,731	5,245
West Virginia	531,762	607,880	833,377	1,009,051	1,034,750	1,062,076	1,193,933
Wisconsin	500	16,016	24,976	34,387	33,800	14,958	4,250
Wyoming	....	....	....	2,682	....	2,916	4,352
Total	8,540,030	10,258,022	11,508,021	10,352,688	12,010,829	9,477,580	9,196,244

The following table gives the relative rank of the States and Territories in the production of coke in the years 1880 to 1894, both inclusive:

STATES AND TERRITORIES.	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894
Pennsylvania	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Alabama	5	5	4	3	2	2	2	4	3	2	2	2	2	2	3
West Virginia	2	2	2	2	3	3	4	2	2	3	3	3	3	3	2
Colorado	7	6	6	5	5	5	5	5	5	5	5	5	4	4	4
Tennessee	3	3	3	4	4	4	3	3	4	4	4	4	5	5	5
Virginia	......	......	......	8	7	7	6	6	6	6	6	6	6	6	6
Georgia	6	7	7	7	6	6	7	8	7	7	7	7	7	7	7
Kentucky	9	10	10	11	12	13	14	12	9	12	11	10	9	8	9
Montana	......	......	......	......	15	15	......	16	12	10	10	11	10	9	12
Ohio	4	4	5	6	8	8	8	7	8	8	8	8	8	10	8
Utah	12	......	13	......	......	......	......	......	......	19	13	14	13	11	11
Wisconsin	......	......	......	......	......	......	......	......	18	9	9	9	11	12	18
New York	......	......	......	......	......	......	......	......	......	......	......	......	......	13	10
Kansas	10	9	9	10	11	11	9	10	11	11	12	12	12	14	13
Indian Territory	11	11	11	13	13	12	12	14	15	15	14	13	16	15	19
Washington	......	......	......	......	14	14	15	11	10	17	17	16	15	16	16
Missouri	......	......	......	......	......	......	......	17	17	16	15	15	14	17	20
New Mexico	......	......	12	12	9	9	10	13	14	18	19	20	......	18	15
Indiana	......	......	......	......	......	......	13	9	13	14	16	18	17	19	14
Wyoming	......	......	......	......	......	......	......	......	......	......	......	19	......	20	17
Illinois	8	8	8	9	10	10	11	15	16	13	18	17	18	21	21

An inspection of the above table indicates that the relative rank of quite a number of the States as coke producers changed in 1894. Pennsylvania still holds the rank which it has occupied in the fifteen years covered by the table. Alabama, which, in the different years covered by the table, has changed its position several times, being as low as fifth, and as high as second in 1893, became third in 1894. West Virginia, which, through most of the recent years, has been third, became second. Colorado maintains the position it had in 1893 as fourth; Tennessee, its position as fifth; Virginia as sixth, and Georgia as seventh, while Kentucky drops from eighth to ninth, and Montana from ninth to twelfth. Ohio has risen from the tenth to the eighth, while Utah maintains its old position as eleventh, and Wisconsin drops from the twelfth to the eighteenth.

VALUE AND AVERAGE SELLING PRICE OF COKE.

In the following table is given the total value of coke produced in the United States in each year from 1880 to 1894, inclusive, by States and Territories:

STATES AND TER'ITORIES	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Alabama....	$ 183,063	$ 326,819	$ 425,940	$ 598,473	$ 609,185	$ 755,645	$ 999,302	$ 775,090
Colorado.....	145,226	267,156	477,665	584,578	409,903	512,162	569,120	682,778
Georgia......	81,789	88,753	100,194	147,166	169,192	144,198	179,031	174,410
Illinois......	41,950	45,850	29,050	28,200	25,639	27,798	21,487	19,594
Indiana......	....	....	....	....	....	....	17,953	51,141
Indian Ty...	4,638	5,304	6,075	7,719	5,736	12,902	22,229	33,435
Kansas.......	6,000	10,200	11,460	16,560	14,580	13,255	19,204	28,575
Kentucky...	12,250	12,630	11,530	14,425	8,760	8,499	10,082	31,730
Missouri.....	....	....	....	....	....	....	....	10,396
Montana....	....	....	....	....	900	2,063	....	72,000
N. Mexico...	....	....	6,000	21,478	91,410	89,700	51,180	82,260
New York...	....	....	....	....	....	....	....	....
Ohio..........	255,905	297,728	266,113	225,660	156,294	109,723	94,042	245,981
Pennsylv'ia	2,255,040	5,896,579	6,133,698	5,410,387	4,783,230	4,981,656	7,664,023	10,746,352
Tennessee...	316,607	342,585	472,505	459,126	428,870	398,459	687,865	870,900
Utah..........	10,000	....	2,500	....	....	....	....	....
Virginia......	....	....	....	44,345	111,300	85,993	305,880	417,368
Washington	....	....	....	....	1,900	1,477	4,125	102,375
W. Virginia	318,797	429,571	520,437	563,490	425,950	485,588	513,843	976,732
Wisconsin..	....	....	....	....	....	....	....	....
Wyoming...	....	....	....	....	....	....	....	....
Total.......	$6,631,265	$7,725,175	$8,462,167	$8,121,607	$7,242,878	$7,629,118	$11,153,366	$15,321,116

STATES AND TERRITORIES.	1888.	1889.	1890.	1891.	1892.	1893.	1894.
Alabama............	$ 1,189,679	$ 2,372,417	$ 2,589,447	$ 2,986,242	3,464,623	2,648,632	1,871,348
Colorado............	716,305	643,479	959,246	896,984	*1,234,320	*1,137,488	*903,970
Georgia...............	177,907	149,059	150,995	231,878	163,614	136,089	116,286
Illinois...............	21,038	29 764	11,250	11,700	7,133	4,400	4,400
Indiana..............	31,993	25,922	19,706	7,596	6,472	9,048	13,102
Indian Territory	21,755	17,957	21,577	30,483	12,402	25,072	10,698
Kansas...............	29,073	26,593	29,116	33,296	19,906	18,640	15,660
Kentucky...........	47,244	29,769	22,191	68,281	72,563	97,350	51,566
Missouri.............	9,100	5,800	9,240	10,000	10,949	9,735	3,568
Montana............	96,000	122,023	125,655	258,523	311,013	239,560	110,000
New Mexico........	51,240	18,408	10,025	10,925	....	18,476	28,213
New York..........	....	....	....	....	....	35,925	....
Ohio..................	166,330	188,222	218,090	76,901	112,907	43,671	90,875
Pennsylvania......	8,230,759	10,743,492	16,333,674	12,679,826	15,015,336	9,468,036	6,585,489
Tennessee..........	490,491	731,496	684,116	701,803	724,106	491,523	480,124
Utah..................	....	3,042	37,196	35,778	....	....	....
Virginia.............	260,000	325,861	278,724	265,107	322,486	282,898	295,747
Washington........	....	30,728	46,696	42,000	50,446	34,207	18,249
West Virginia.....	905,549	1,074,177	1,524,746	1,845,043	1,821,965	1,716,907	1,639,687
Wisconsin..	1,500	92,092	143,612	192,804	185,900	95,851	19,465
Wyoming..........	....	....	....	8,046	....	10,206	†15,232
Total..............	$12,445,963	$16,630,301	$23,215,302	$20,393,216	$23,536,141	$16,523,714	$12,273,669

*Includes Utah's value. †Value estimated.

While this table gives the totals of the values as returned in the schedules, the figures do not always represent the same thing. A statement as to the actual selling price of the coke was asked for, and in most cases, including possibly 80 per cent. of all the coke produced, the figures are the actual selling price. In some cases, however, the value is an estimate. Considerable of the coke made in the United States is produced by proprietors of blast furnaces for consumption in their own furnaces, none being sold. The value, therefore, given for this coke would be an estimate based, in some instances where there are coke works in the neighborhood selling coke for the general market, upon the price obtained for this coke; in other cases the cost is estimated at the cost of the coke at the furnace, plus a small per centage of profit on the coking operation, while in still other cases the value given is only the actual cost of the coke at the ovens. In the following table is given the average value per short ton of the coke made in the United States for each year from 1880 to 1894, inclusive, by States and Territories:

Average Value per Short Ton at the Ovens of the Coke Made in the United States in the Years from 1880 to 1884, Inclusive, by States and Territories.

STATES AND TERRITORIES.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.
Alabama	$ 3 01	$ 3 00	$ 2 79	$ 2 75	$ 2 50	$ 2 50	$ 2 65	$ 2 39	$ 2 34	$ 2 30	$ 2 41	$ 2 33	$ 2 31	$ 2 27	$2 025
Colorado	5 68	5 29	4 67	4 36	3 45	3 88	3 99	4 00	4 00	3 43	3 90	3 24	3 31	(a) 3 13	(a) 2 85
Georgia	2 15	2 15	2 15	2 20	2 13	2 04	2 17	2 20	2 12	1 57	1 48	2 25	2 00	1 50	1 25
Illinois	3 30	3 10	2 55	2 10	1 96	2 69	2 65	2 13	2 84	2 57	2 25	2 25	2 25	2 00	2 00
Indiana	....	....	....	....	....	....	2 93	2 81	2 68	3 12	3 28	2 00	2 02	1 58	2 00
Indian Territory	3 00	3 00	3 00	3 00	3 00	3 60	3 50	3 33	2 90	2 70	3 25	3 22	3 47	3 51	3 50
Kansas	1 95	1 80	1 70	1 96	2 02	1 65	1 54	1 91	1 96	1 91	2 37	2 35	2 18	2 18	1 855
Kentucky	2 88	2 89	2 83	2 87	3 94	3 14	2 23	2 18	2 04	2 28	1 80	2 02	2 01	2 00	1 73
Missouri	....	....	....	....	....	....	....	3 50	3 50	1 10	1 51	1 46	1 50	1 65	1 58
Montana	....	....	....	....	12 00	11 72	....	10 00	8 00	8 69	8 71	8 91	9 00	8 00	11 00
New Mexico	....	....	6 00	5 50	5 00	5 00	5 00	6 00	6 00	5 32	4 89	4 75	....	3 18	4 32
New York	....	....	....	....	....	....	....	....	....	....	....	....	....	2 80	....
Ohio	2 54	2 49	2 57	2 57	2 49	2 78	2 69	2 65	2 48	2 50	2 92	1 99	2 18	1 95	2 78
Pennsylvania	1 86	1 70	1 55	1 22	1 25	1 25	1 42	1 84	1 26	1 40	1 91	1 82	1 80	1 52	1 086
Tennessee	2 42	2 33	2 52	2 25	1 95	1 31	1 87	2 19	1 27	2 03	1 96	1 93	2 05	1 85	1 641
Utah	10 00	....	10 00	....	....	....	....	....	....	4 00	4 36	4 50	....	....	....
Virginia	....	....	....	1 75	1 75	1 75	2 50	2 50	1 74	2 22	1 68	1 58	2 18	2 26	1 64
Washington	....	....	....	....	4 75	4 75	5 00	7 00	....	8 00	8 00	7 00	7 03	5 08	3 48
West Virginia	2 30	2 30	2 26	2 19	1 19	1 86	1 94	2 22	1 70	1 76	1 83	1 88	1 76	1 62	1 393
Wisconsin	....	....	....	....	....	....	....	....	3 00	5 75	5 75	5 61	5 50	6 41	4 58
Wyoming	....	....	....	....	....	....	....	....	....	....	....	3 00	....	3 50	(b) 3 50
Average	$ 1 99	$ 1 88	$ 1 77	$ 1 49	$ 1 49	$ 1 49	$ 1 63	$ 2 01	$ 1 46	$ 1 62	$ 2 02	$ 1 97	$ 1 96	$ 1 74	$1 337

(a) Utah included. (b) Value estimated.

From this table it appears that the average value per ton of coke made in the United States in 1894 was the lowest since 1880, it being $1.33.7, the nearest approach to this being in 1888, when the average price was $1.46. The average price varied from $1.08.6 in Pennsylvania to $11 in Montana, the average price at ovens in West Virginia being $1.37.3; in Alabama, $2.02.5, and in Tennessee, $1.64. In comparing and considering prices, the statement previously made as to value of these values must always be borne in mind.

COAL CONSUMED IN THE MANUFACTURE OF COKE IN TENENSSEE.

The amount of coal used in the manufacture of coke (short tons) in 1880, 217,656; 1881, 241,644; 1882, 313,537; 1883, 330,961; 1884, 348,295; 1885, 412,538; 1886, 621,669; 1887, 655,857; 1888, 630,099; 1889, 626,016; 1890, 600,387; 1891, 623,177; 1892, 600,126; 1893, 449,511; 1894, 516,802.

The reports to this Bureau do not give the amount consumed in 1895, but will be obtained and given in next report.

In regard to these figures, they are simply estimates. At but few of the works are any provisions for weighing coal before being charged into the ovens. A great deal of the coke made in Tennessee is from run of mines; that is, all the product of mining—lump, nut, and slack—as it comes to the mouth of the mines in the mine car is charged into ovens, and if no coal is sold as coal it is comparatively easy to ascertain from the amounts paid for mining what is the amount of coal charged into the ovens. But even in such cases considerable difficulty arises, from the fact that mining is paid for by the measured bushel, or ton of so many cubic feet, while our statistics are by weight, and the measured bushel or ton is often not the equivalent of the weighed bushel or ton. It is also true that in certain districts, where the men are paid by the car, the car contains, even of measured tons, more than the men are paid for. Under such circumstances, it is not to the interest of the operator to weigh the coal as it is charged into the ovens.

Further, in many districts coke-making is simply for the purpose of utilizing the slack coal produced in mining, or that which falls through the screen at the tipple when lump coal is sold. In such cases the slack is rarely, if ever, weighed as it is charged into the ovens, so that any statement as to the amount of coal used at such works will be an estimate. At some works the coal is often weighed, for a brief period, and the coke being weighed as it is sold, a per centage of yield is ascertained, which is used in statements as to the amount of coal used and the yield of this coal in coke.

The Tennessee Coal, Iron & Railway Company are the largest producers of coke in Tennessee. All the coal used in their ovens is mined from the Sewanee seam; the Roane Iron Company from a seam which seems identical with Sewanee. The Dayton Coal & Iron Company makes a large amount of coke from coal beds in the immediate vicinity of its blast furnaces; the Richland mines being quite identical with the Sewanee, and the Nelson and Dixon slope, a seam below the Sewanee. The Mingo seam is not identical with other veins now worked in Tennessee, but common to Kentucky, being a portion of Kentucky's field that overlaps this State in Claiborne, and, perhaps, Campbell Counties.

The following are some analyses of Tennessee coals, and cokes made from the same, given by the United States Geological Survey:

Analyses of two samples of coal from mines of Roane Iron Co., Rockwood, Roane County:

	Per cent.	Per cent.
Fixed Carbon	60.110	60.750
Ash	11.520	5.270
Sulphur	1.049	
Volatile matter	26.62	32.50
Water	1.750	1.390

Analyses of two samples of coal from the Sewanee seam, Tracy Mines, Tracy City, Grundy County:

	Per cent.	Per cent.
Fixed carbon	62.000	63.500
Volatile matter	25.41	29.90
Ash	10.820	6.600
Sulphur		trace
Water	1.770	

Analysis of coke produced from coal from Sewanee seam, Tracy Mines:

Fixed carbon	83.364 per cent.
Ash	15.440 per cent.
Sulphur	.142 per cent.

Analyses of coal and coke from the Etna Mines, Whitesides, Marion, County:

	Coal—Per cent.	Coke—Per cent.
Fixed carbon	74.200	94.500
Volatile matter	21.39	4.650
Ash	2.600	.790
Sulphur	.700	.008
Water	1.300	
Phosphorous	.005	

Analysis of coal from Soddy Mines, Sewanee seam, Soddy, Hamilton County:

Fixed carbon	64.390 per cent.
Volatile matter	27.82 per cent.
Ash	6.640 per cent.
Water	1.150 per cent.

Analysis of coal from ——— Mines, Etna, Marion County:

Fixed carbon	94.56 per cent.
Ash	4.65 per cent.
Sulphur	0.79 per cent.

The last analysis given was made by a Philadelphia chemist, and must have been well selected.

ANALYSES OF COKE.

	Rockwood Coal	Dayton Coal	Buckeye Coke Co.	Glen Mary Coal & Coke Co.	Unwashed Slack. Glen Mary Coal & Coke Co.		Mingo Coal & Coke Co.
Fixed carbon	84.187	84.150	88.300	61.630	91.00	89.70	89.960
Ash	14.141	14.880	9.850	1.640	9.00	10.30	8.920
Sulphur	0.182		.370	.290	.60		.890
Volatile matter and Moisture			1.480				.760
Gas				36.730			
Phosphorous							.008
Total	98.510	99.030	100.00	100.290	100.60	100.00	100.538

The analysis of coke from the Buckeye Coal Co., Pioneer, Tenn., which is exceedingly low in sulphur, was made from washed slack and nut, and, as we have been informed, is the average of at least a dozen analyses, in none of which the sulphur exceeded four-tenths of 1 per cent. Under head of Reports of Inspections will be found some recent analyses of coal and coke.

The following are the statistics of the manufacture of Coke in Tennessee for the years 1880 *to* 1894:

YEARS.	Establishments.	Ovens Built.	Ovens Building.	Coal Used. (Short Tons.)	Coke Produced. (Short Tons.)	Total Value of Coke at Ovens.	Value of Coke at Ovens per Ton.	Yield of Coal in Coke. Per cent.
1880	6	656	68	217,656	130,609	$ 316,607	$ 2.42	60.
1881	6	724	84	241,644	143,853	342,585	2.38	60.0
1882	8	861	14	313,537	187,695	472,505	2.52	60.0
1883	11	992	10	330,961	208,691	459,126	2.25	62.0
1884	(a) 13	1,105	175	348,295	219,723	428,870	1.91	63.0
1885	12	1,387	86	412,588	218,842	398,459	1.82	53.0
1886	12	1,485	126	621,659	368,139	687,865	1.87	59.0
1887	11	1,560	165	655,857	396,979	870,900	2.19	61.0
1888	11	1,534	84	630,099	385,693	490,491	1.27	61.0
1889	12	1,639	40	626,016	359,710	731,496	2.08	57.0
1890	11	1,664	292	600,387	348,728	684,116	1.96	58.0
1891	11	1,995	....	623,177	364,318	701,803	1.93	58.0
1892	11	1,941	....	600,126	354,096	724,106	2.05	59.0
1893	11	1,994	....	449,511	265,777	491,523	1.85	59.0
1894	11	1,860	....	516,802	292,646	480,124	1.64	56.6

(a) One establishment made coke in pits.

It will be seen from the above statement that the production of coke in Tennessee increased in 1894 over 1893, this State and the two Virginia's being the only coke-producing States that showed any increase in production.

The character of the coal used in the manufacture of coke in Tennessee since 1890 *is shown in the following table:*

YEARS.	RUN OF MINES.—SHORT TONS.		SLACK.—SHORT TONS.		TOTAL. (SHORT TONS.)
	Unwashed.	Washed.	Unwashed.	Washed.	
1890	255,359	....	273,028	72,000	600,387
1891	184,556	....	377,914	60,707	623,177
1892	176,433	15,000	367,827	40,846	600,126
1893	179,126	....	137,483	132,902	449,511
1894	166,990	61,841	149,958	138,018	516,802

It will be seen from the above statement that most of the coke made in Tennessee is made from slack, 287,971 tons of the total of

516,802 tons of coal coked being slack, about one-half being used washed, and the other half unwashed.

The production of coke in this State for 1895 is as follows:

COMPANY.	LOCATION.	COUNTY.	NO. OVENS.	OUTPUT IN SHORT TONS.
Tenn. C., I. & R. R. Co.	Tracy City	Grundy	444	106,503
Tenn. C., I. & R. R. Co.	Whitwell	Marion	100	40,566
Tenn. C., I. & R. R. Co.	Victoria	Marion	70	
Etna Coal Co.	Whitesides	Marion	110	19,181
*New Daisy Coal Co.	Daisy	Hamilton	50	....
New Soddy Coal Co.	Soddy	Hamilton	156	29,707
Sale Creek Coal Co.	Sale Creek	Hamilton	42	500
Fox Coal & Coke Co.	Graysville	Rhea	20	1,102
Dayton Coal & Iron Co.	Dayton	Rhea	327	70,899
Roane Iron Co.	Rockwood	Roane	186	63,639
Glen Mary Coal & Coke Co.	Glen Mary	Scott	70	8,569
Mingo Coal & Coke Co.	Hartranft	Claiborne	226	22,036
Buckeye Coke Co.	†Pioneer	Campbell	36	8,000
Black Diamond Coal Co.	Coal Creek	Anderson	8	1,045
Totals	....	....	1,845	371,747

*Not in operation. †Pioneer ovens are the "Thomas" ovens.

Coke washing plants are in use at the following coke plants: Tracy City, 2; Soddy, 1; Rockwood, 1; Pioneer, 1; Mingo, 1.

PIG IRON PRODUCTION IN 1895.

PRODUCTION OF PIG IRON IN THIS AND OTHER STATES THIS YEAR SHOWS CONCLUSIVELY THE BETTERMENT OF BUSINESS CONDITIONS.

Complete returns of the production of pig iron in the United States in 1895, and also complete returns of the stocks of unsold pig iron in the hands of makers or their agents at the close of the year.

The total production of pig iron in 1895 was the largest in our iron-making history, amounting to 9,446,308 gross tons, against 6,657,388 tons in 1894, 7,124,502 tons in 1893, 9,157,000 tons in 1892, 8,279,870 tons in 1891 and 9,202,703 tons in 1890. The production in 1895 was 2,788,920 tons, or nearly 42 per cent. more than in 1894, and 243,605 tons more than in 1890, when our largest previous production was attained.

All the large pig iron producing States shared in this greatly-increased production in 1895 over 1894. As might be expected, the most notable increase was in Pennsylvania, which produced 4,701,163 tons, or 49.76 per cent. of the total production, Allegheny County alone producing 2,054,585 tons, which was 590,796 tons more than the production of Ohio, more than double that of Illinos, and nearly two and a-half times that of Alabama; and yet Ohio, Illinois, and Alabama made splendid records in 1895, as compared with 1894.

The stock of pig iron which was unsold in the hands of manufacturers or their agents on December 31, 1893, and which were not intended for their own consumption, amounted to 662,068 gross tons; on June 30, 1894 they had fallen to 517,688 tons; on June 30, 1895, they had fallen to 439,290 tons; and on December 31, 1895, they amounted to 444,332 tons, a very slight increase over the unsold stocks on June 30, 1895.

The following table gives the details of the production for the year:

TOTAL PRODUCTION OF PIG IRON.

STATES.	BLAST FURNACES.				PRODUCTION. Gross tons of 2,240 pounds. (Includes Spiegleisen.)		
	In blast June 30, 1895.	Dec. 31, 1895.					
		In.	Out.	Total.	First half of 1895.	Second half of 1895.	Total for for 1895.
Massachusetts	1	1	2	3	2,194	2,516	4,710
Connecticut	1	1	5	6	2,438	3,177	5,615
New York	3	6	16	22	88,369	93,333	181,702
New Jersey	4	4	8	12	28,112	27,390	55,502
Pennsylvania	80	103	76	179	2,087,381	2,613,782	4,701,163
Maryland		1	8	9		10,916	10,916
Virginia	10	17	11	28	142,580	204,009	346,589
North Carolina		1	1	2		323	323
Georgia	2	2	3	5	11,535	19,499	31,084
Alabama	20	22	29	51	390,553	464,114	854,667
Texas	1	1	3	4	2,502	2,180	4,682
West Virginia	2	3	1	4	62,567	79,401	141,968
Kentucky	3	4	5	9			
Tennessee	7	8	17	25	114,169	133,960	248,129
Ohio	33	40	23	63	632,571	831,218	1,463,789
Indiana							
Illinois	11	15	2	17	376,401	629,690	1,006,091
Michigan	3	6	9	15	45,868	43,354	91,222
Wisconsin	3	5	1	6	53,750	94,650	148,400
Minnesota							
Missouri	1	1	3	4	2,267	25,251	27,518
Colorado	1	1	2	3	25,016	33,492	58,508
Oregon			1	1			
Washington							
Total, 1895	186	242	230	472	4,087,558	5,358,750	9,446,308
Total, 1894	108	185	326	511	2,717,983	3,939,405	6,657,388

PRODUCTION OF CHARCOAL PIG IRON.

Massachusetts	1	1	2	3	2,194	2,516	4,710
Connecticut	1	1	5	6	2,438	3,177	5,615
New York	1	1	4	5	2,700	2,520	5,220
Pennsylvania	1	3	10	13	1,803	2,671	4,474
Maryland			4	4			
Virginia			4	4			
Georgia	1	1	2	3	6,453	6,012	13,365
Alabama	2	2	10	12	2,760	15,056	18,816
Texas	1	1	3	4	2,502	2,180	4,682
Kentucky			3	3			
Tennessee	2	2	10	12	9,910	9,333	19,243
Ohio	2	4	6	10	3,644	6,813	10,457
Michigan	3	6	9	15	45,868	45,354	91,222
Wisconsin	1	1	1	2	21,149	24,808	45,957
Missouri			1	1	1,580		1,580
Oregon			1	1			
Washington			1	1			
Total, 1895	16	23	76	99	103,001	123,340	225,341
Total, 1894	22	24	92	116	102,697	119,725	222,422

PRODUCTION OF BITUMINOUS COAL AND COKE PIG IRON.

STATES.	Blast Furnaces.				Production. Gross tons of 2,240 pounds. (Including Spiegletsm.)		
	In blast June 30, 1895.	Dec. 31, 1895.					
		In.	Out.	Total.	First half of 1895.	Second half of 1895.	Total for for 1895.
New York	1	2	....	2	58,217	54,674	112,891
Pennsylvania	52	51	24	75	1,653,663	1,891,220	3,544,883
Maryland	....	1	4	5	....	10,916	10,316
Virginia	10	17	7	24	142,580	204,009	346,589
North Carolina	....	1	1	2	....	323	323
Georgia	1	1	1	2	5,082	12,587	17,669
Alabama	18	20	19	39	387,793	448,058	835,851
West Virginia	3	3	1	4	62,567	79,401	141,968
Kentucky	3	4	2	6	19,285	44,495	63,780
Tennessee	6	6	7	13	104,259	124,627	228,886
Ohio	31	36	17	53	628,927	824,405	1,453,332
Indiana	....	....	2	2	....	....	....
Illinois	11	15	2	17	376,401	629,690	1,006,091
Wisconsin	2	4	....	4	32,601	69,842	102,443
Minn0sota	....	....	1	1	....	....	....
Missouri	1	1	2	3	687	25,251	25,938
Colorado	1	1	2	3	25,016	33,492	58,508
Total, 1895	138	163	92	255	3,497,078	4,452,990	7,950,068
Total, 1894	55	127	131	258	2,203,239	3,316,985	5,520,224

PRODUCTION OF ANTHRACITE AND MIXED ANTHRACITE AND COKE PIG IRON.

New York	1	3	12	15	27,452	36,139	63,591
New Jersey	4	4	8	12	28,112	27,390	55,502
Pennsylvania	27	49	42	91	431,915	719,891	1,151,806
Total, 1895	32	56	62	118	487,479	783,420	1,270,899
Total, 1894	31	34	103	137	412,047	502,695	914,742

MISCELLANEOUS PIG-IRON STATISTICS.

PRODUCTION ACCORDING TO FUEL USED.

FUEL USED.	BLAST FURNACES.				PRODUCTION. Gross tons of 2,240 pounds. (Includes Spiegeleisen.)		
	In blast June 30, 1895.	Dec. 31, 1895.					
		In.	Out.	Total.	First half 1895	Second half 1895	Total for 1895
Anthrcite	32	56	62	118	487,479	783,420	1,270,899
Charcoal	16	23	76	99	103,001	122,340	225,341
Bituminious	138	163	91	254	3,497,078	4,452,990	7,950,068
Total	186	242	229	471	4,087,558	5,358,750	9,446,308

PRODUCTION IN CERTAIN DISTRICTS.

Pennsylvania.	Lehigh Valley	10	18	23	41	123,771	264,473	388,244
	Schu'l. Valley	8	14	12	26	167,200	207,360	372,560
	U. Sus. Valley	8	4	3	7	38,199	55,031	93,230
	L. Sus. Valley	10	15	6	21	159,575	550,587	410,162
	Jun'ta Valley	3	6	6	12	35,573	65,525	101,098
	Shen. Valley	14	10	11	21	408,344	411,693	820,037
	Alle'y Co.	24	25	2	27	951,991	1,102,595	2,054,585
	Mis. Bitu	7	8	3	11	200,925	253,848	454,772
	Charcoal.	1	3	10	13	1,803	2,675	4,474
Ohio.	Mah. Valley	11	13	1	14	288,035	332,491	620,526
	Hock. Valley	2	2	10	12	12,765	27,935	40,700
	Lake Co.	5	5	0	5	119,113	167,748	286,861
	Mis. Bit.	6	8	2	10	141,609	233,324	374,933
	H. R. Bit	7	8	4	12	67,405	62,907	130,312
	H. R. Char	2	4	6	10	3,644	6,813	10,457

PRODUCTION OF BESSEMER PIG-IRON.

New York	....	....	....	....	6,473	5,465	11,938
Pennsylvania	....	....	....	....	1,530,410	1,900,470	3,430,880
Maryland	....	....	....	....	....	10,916	10,916
West Virginia	....	....	....	....	62,567	79,401	141,968
Kentucky	....	....	....	....	....	10,000	10,000
North Carolina	....	....	....	....	....	323	323
Ohio	....	....	....	....	446,754	584,981	1,031,735
Illinois	....	....	....	....	325,968	559,776	885,744
Michigan	....	....	....	....	1,789	....	1,789
Wisconsin	....	....	....	....	4,027	12,952	16,979
Missouri	....	....	....	....	687	25,151	25,938
Colorado	....	....	....	....	23,348	32,137	55,485
Total	....	....	....	....	2,402,023	3,221,672	5,623,695

PRODUCTION OF PIG-IRON FROM 1892 TO 1895.

STATES.	GROSS TONS OF 2,240 POUNDS.			
	1892	1893	1894	1895
Massachusetts	7,946	7,853	156	4,713
Connecticut	17,107	12,478	7,416	5,615
New York	310,395	191,115	175,185	181,710
New Jersey	87,975	74,305	63,273	55,502
Pennsylvania	4,193,805	3,643,022	3,370,152	4,701,163
Maryland	99,131	151,773	5,600	10,916
Virginia	342,847	302,856	298,086	346,589
North Carolina	2,908	2,843	....	323
Georgia	9,950	39,675	40,269	31,034
Alabama	915,296	726,888	592,392	854,667
Texas	8,613	6,257	4,671	4,682
West Virginia	154,796	81,591	80,781	141,968
Kentucky	56,548	47,501	33,854	63,780
Tennessee	300,081	207,915	212,773	248,129
Ohio	1,221,918	875,265	900,029	1,463,789
Indiana	7,700	5,561	....	....
Illinios	949,450	405,267	604,795	1,006,091
Michigan	184,421	117,538	95,171	91,220
Wisconsin	174,961	131,772	91,595	148,400
Missouri	57,020	32,360	6,522	27,518
Minnesota	14,071	10,373	....	....
Colorado	32,441	45,555	73,669	58,508
Oregon	7,628	4,739	1,000	....
Total	9,157,000	7,124,502	6,657,388	9,446,308

IRON FURNACES IN TENNESSEE.

FURNACE.	KIND.	Capacity in tons each 24 hours.	LOCATION.	COUNTY.	OWNERS.
Bristol	Coke	150	Bristol	Sullivan	Bristol Iron and Steel Company.
Carnegie	"	150	Carnegie	Washington	Carnegie Iron Company.
Embreeville	"	125	Embreeville	Washington	Embreeville Iron Company.
Rockwood	"	130	Rockwood	Roane	Roane Iron Company.
Dayton No. 1	"	140	Dayton	Rhea	Dayton Coal and Iron Company (limited).
Dayton No. 2	"	140	Dayton	Rhea	Dayton Coal and Iron Company (limited).
Chattanooga	"	65	Chattanooga	Hamilton	Chattanooga Iron Campany.
Citico	"	130	Chattanooga	Hamilton	Citico Iron Company.
South Pittsburg No. 1	"	175	South Pittsburg	Marion	Tennessee Coal, Iron and Railroad Co.
South Pittsburg No. 2	"	175	South Pittsburg	Marion	Tennessee Coal, Iron and Railroad Co.
South Pittsburg No. 3	"	175	South Pittsburg	Marion	Tennessee Coal, Iron and Railroad Co.
Cowan	"	150	Cowan	Franklin	Tennessee Coal, Iron and Railroad Co.
Gracy Woodward	"	150	Clarksville	Montgomery	Gracy Woodward Iron Company.
Butler	Charcoal.	15	Mountain City	Johnson	
Maxwell	"	20	Carter's Furnace	Carter	Knoxville Car Wheel Company.
Bear Spring	"	15	Bear Spring	Stewart	Lowry Iron Company.
Cumberland	"	45	Cumberland Furnace	Dickson	Buffalo Iron Company.
Lagrange	"	40	Stribling	Stewart	Buffalo Iron Gompany.
Warner	"	40	Goodrich	Hickman	Ruffalo Iron Company.
Etna	"	50	Etna	Hickman	Buffalo Iron Company.
Warner	"	50	Warner	Hickman	Buffalo Iron Campany.
Wayne No. 1	"	60	Mannie	Wayne	Buffalo Iron Compauy.
Wayne No. 2	"	60	Mannie	Wayne	Buffalo Iron Company.
Napier	"	40	Napier	Lewis	Napier Iron Company.
Rockdale	"	35	Rockdale	Maury	Rockdale Furnace Company.

Total capacity 2,825 tons each 24 hours,

THE MARBLE INDUSTRY.

The development of marble quarries and mills in East Tennessee should be an item of interest and pride to this State, for it will be, in the near future, a business of great magnitude. No special statistics could be procured of the business of 1895, and, that the industry might be better known to our people, we have reproduced part of an article from "Stone," July, 1895.

EAST TENNESSEE MARBLE.

Extensive tests have been made at the Engineering Laboratory of the University of Tennessee to determine the qualities of Tennessee marble as a building stone. One-inch cubes, sawed and sand rubbed, were supplied by the quarrymen in numbers sufficient to give carefully verified tests. Standard two-inch cubes could not be broken with the 20,000-pound Olsen testing machine used. It is a well-known fact among experimenters that the crushing load per inch of bed area increases with the bed area. Gen. Gilmore gives, as a result of experiments on cubes of various sizes, the formula, $y=a\ 3+x$, in which x is the side of any cube, y is crushing load per square inch, and a the crushing load of a one-inch cube. To compare the results obtained with probable results with two inch cubes, we have only to multiply by the cube root of two, or one and one-fourth, nearly. As the cubes in the tests made seldom had two faces exactly parallel, a hard card-board cushion was used, which is in accordance with good practice in such tests, and more nearly approaches the actual conditions of load in a wall than crushing against iron faces. Such cushions introduce very small, if any, lateral forces by flowing under high pressure, and the results may be taken as giving the absolute strength of the samples tested.

TABLE I.

DESCRIPTION OF MARBLE.	Number of samples broken.	Crushing Load.	REMARKS.
1. Light pink marble, with few traces of fossils, and nearly white when tool-dressed or sand-rubbed.........	4	16,500	
2. Dark pink marble, from same quarry as No. 1, but taken from a higher stratum...............................	2	13,750	A fair sample of a grade of marble suitable only for interior work.
3. Light gray marble, with dark blue lines, nearly free from fossils.......	5	17,060	A fair sample of well-known marble.
4. Dark variegated marble, of chocolate, with fossils well defined and abundant..	6	17,600	A much higher test than can be expected from the dark variegated marbles as a class.
5. A dark variegated marble, recently opened	4	16,150	This was the only sample tested that showed any well defined bedding.
6. An average sample of dark, variegated marble, so much used for interior work a few years ago.......	4	14,400	
7. A light colored marble, gray and pink, uniform in color, fossils well defined and abundant..........	8	18,100	

In Table I are given the results of tests made for crushing. An effort to detect any difference in the crushing with the load applied perpendicular to the bedding, and parallel with it, was without success; developing a fact well known among the quarrymen, that the stone has no bedding, but splits equally well in all directions. The average crushing load on all the samples tested was 16,600 pounds per square inch. By substituting this value in Gen. Gilmore's formula, we find the crushing load for a two-inch cube to be 20,700 pounds per square inch. This is very great strength, seldom reached by any rocks except granite and trap.

A test of perhaps much greater importance is for the per cent. of absorption. In the climate of our Northern States and Canada, the alternate freezing and thawing for so many months of the year make it imperative that the stone shall not absorb water to any great extent. The beauty of the stone cannot be neglected, particularly in monumental work, in trimmings, and in buildings where architectural effects are to be brought out and retained. A non-absorbent stone is washed clean by each heavy rain, and its original beauty is retained, while a porous stone soon fills with dirt and smoke and it looks no better than a wall plastered with cement. In general, the density of the stone, its hardness and strength to resist a common load, vary inversely as the per cent. of absorption. Nor, can the absorption be neglected in marble for interior decoration. Ink, oils, or drugs may ruin expensive furnishings if the stone is porous. Experiments were conducted with unusual care to test for the absorption of Tennessee marbles, along with other well-known and highly valued building stones. This was done, not as an attack on these stones, but to compare the Tennessee marble with well-known standards. The weighing was carried to an accuracy of one part in 8,000. The samples were first weighed as they came to the laboratory to check subsequent work. They were then subjected to a temperature ranging from 212° F. to 275° F., and weighed each day till their weights dropped to a constant, that is, till they no longer lost in weight. The samples were then put into water and weighed daily till their weights had again reached a constant.

In Table II. the numbers in the first column refer to samples of the same rock given in Table I. In the first column the results are in round numbers, giving a ready means of comparing the absorption of the different rocks tested. It will be seen that a most excellent granite absorbs about two and one-half times as much water as the better grades of Tennessee marble, and that the other standard building stones tested absorb many times as much.

TABLE II.

SAMPLES.	Weight Dry.	Weight after Immersion.	Gain in Weight.	Parts by weight of Stone for one part of Water absorbed.	Per cent gain.	REMARKS.
1	42.700 gr.	42.735 gr.	.035	1 in 1,220.	.00082	
2	44.200 gr.	44.775 gr.	.075	1 in 600.	.0017	This result is as far from the average that it seems hardly creditable.
3	43.54 gr.	43.57 gr.	.03	1 in 1,240.	.0003	
4	43.15 gr.	43.19 gr.	.04	1 in 1,100.	.00093	
5	46.53 gr.	46.53 gr.	.00	Less than 1 in 8,000.	.0000	This result seems hardly creditable also.
6	53.48 gr.	53.525 gr.	.045	1 in 1,070.	.00093	
7	44.63 gr.	44.635 gr.	.025	1 in 1,480.	.00069	
Vermont white marble...........	124.14 gr.	124.59 gr.	2.45	1 in 300.	.0036	
Rhode Island granite...........	120.10 gr.	120.335 gr	.235	1 in 500.	.002	This is the average sample of three tests.
Lake Superior (red) sandstone	97.23 gr.	103.97 gr.	6.74	1 in 15.	.067	This stone increased in weight during last 24 hours, and probably would absorb more water.
Oolitic limestone from Indiana.	128.96 gr.	135.95 gr.	6.99	1 in 18.	.054	Do. (same).

The study of a thin section of a rock under a compound microscope has come to be one of the recognized methods of determining its quality. The crystalline or granular character of the rock is shown, the nature of the coloring matter, the pores and any other imperfections not showing to the naked eye that would affect the life of the stone. A large number of microscopic sections of Tennessee marble were made by Prof. Samuel W. McCallie, of the University. Four micro-photographs are given of marbles. No. 1 shows no signs of fossils. The crystals are perfectly formed and completely interlocked, leaving no vacant spaces between them.

The black line is one of the dark blue lines common in Tennessee marble. The color in this sample is due to carbon, and the line is not necessarily a line of weakness. In the cut of sample No. 2 faint traces of the coral are still visible, crossing the cut in parallel lines. The structure of these marbles, as shown by the microscope, explains their great strength and low absorption. Evidently No. 1 would weather more smoothly than No. 2, owing to more perfect crystallization. No. 3 is a typical specimen of the Hawkins County variegated, which is so extensively used as an ornamental stone for furniture, interior decorations, etc. No. 4 is a section of the gray Knox, used as a building stone, which frequently contains numerous dark-colored zig-zag lines, not shown in this section, due to the segregation of carbonaceous material.

The following is a copy of chemical analysis of sample No. 1, made by Dr. Albert L. Colby, of the School of Mines, New York City:

Moisture	0.125		
Silica	0.125		
Sesqui-oxide of iron	0.260		
Alumina	trace	Carbonate of lime	98.78
Lime	53.320		
Magnesia	0.2216	Carbonate of magnesia	0.0669
Carbonate acid	43.510		
Sulphur	0.0051		98.8469
Organic matter and loss	0.6333		
	100.0000		

Dr. Colby says: "This analysis was made on an average sample of the four large blocks submitted. The results warrant me in stating that the marble is the purest I have ever examined. The extremely low percentage of iron and sulphur is a guarantee that the marble will wear well, and not stain or tarnish in spots on exposure to the atmosphere. The stone is a very pure carbonate of lime (98.78 per cent.), and so far as its chemical properties are concerned the analysis show it will make an excellent building material."

The history of the marble industry in East Tennessee dates from about 1838, when the marble room in the capitol at Washington was finished with marble taken from a quarry opened by the government in Hawkins County. From this beginning the Hawkins County marble—a rich chocolate in color, interspersed with many fossils—became justly popular for interior decorations and for furniture. Quarries of the same stone have been developed in Knox and anjacent counties. The blocks are difficult to obtain without flaws; the marble is not completely crystalline and is subject to "dries." Such a stone would weather unevenly, disintegrate rapidly, and would have lines of weakness not allowable in good building stone. These highly colored marbles are losing their popularity, and are being replaced by the pink and gray marbles because of their freedom from flaws of any kind, their soft colors and the high polish which they will take. And it is these pink and gray, with a few of the better grades of the dark variegated marbles, that furnish the stone suitable for building.

The price of marble loaded on the cars at Knoxville a few years ago was $2.50 per cubic foot. Due to greater competition and general depression in trade, the price has dropped so that blocks for the saw may be had at from $1.00 to $1.50 per cubic foot. This is for blocks of one hundred cubic feet or more. In the development of quarries, an immense amount of marble remains in blocks too small to saw profitably, and goes to the dump. Small quantities are used for burning lime, for "road metal," and even for railroad ballast. These blocks are eminently suited for building stone, and, being the refuse of the quarry, can be handled at a very low price, enabling the quarry men to put an excellent marble in competition with much inferior stone. One stone contracting firm of Knoxville fills all its orders for trimmings, when limestone is specified, with marble at the price of limestone. Put into a wall rock-faced, the pink and gray marbles cannot be excelled in beauty. Their strength and durability commend them for foundations and heavy masonry in general.

Tennessee marble must not be classed, however, with the cheap building materials. It is essentially a monumental stone, a stone capable of receiving and retaining artistic effects. A study of the absorption table shows it the equal, if not the superior, to the highest grades of granite. For all classes of work, both exterior and interior, the gray and pink, and a few grades of the dark variegated marbles, are competitors of granite. Careful tests of the action of fire on building materials show marble far superior to any granite in its ability to resist high temperatures. Granite crumbles away at a temperature below 800° F., while a temperature of 1200° F., sufficient to convert the marble into quicklime, must be applied before it suffers any material injury. Tennessee marble not only can compete with granite, but can be put into a building much cheaper than granite, from the fact that it can be sawed to any desired thickness and used as veneer, allowing the use of cheap stone or brick for the body of the walls, and giving the results equal in all respects to solid marble walls.

The use of Tennessee marble for exterior work has been chiefly within the State. The Custom Houses at Memphis, Chattanooga and Knoxville, built of gray marble, do credit to the Government and the State. In New Orleans is the Robert E. Lee monument, of gray marble. The Blackstone Memorial Library, at Brantford, Conn., one of the most perfect designs of S. S. Beman, of Chicago, is now being built of pink marble. Little effort has been made up to date to put the marble on the market other than for interior decoration.

In the year 1831 the Legislature of Tennessee appointed a State Geologist—a Dr. Troost—who served in that capacity about ten years. During that time he made extensive researches and a number of reports to the people of the State, upon various minerals, but nothing very definite regarding the marble deposits. However, he seems to have been a believer in its utility, for in April, 1838, he organized the Rogersville Marble Company, whose quarry was located about five miles north of Rogersville, Hawkins County. This was the beginning of the marble industry. It is evident from the old tomb-stones to be seen in a number of church-yards, and and noticeably those around the First Presbyterian Church, at the corner of Church and State streets, Knoxville, that the marble of the vicinity had been taken out and used for manufacturing purposes for many years previous, but by whom is unknown. And these old tomb stones have become one of the most unfailing proofs of the enduring qualities of Tennessee marble. Roughly dressed by hand chisels, many of them originally from stone that would now be classed unsound, they still retain sharp and clear the tool-marks of their old manufacturers. A number in the church-yard mentioned must have been in position from eighty to ninety years, under the drippings of the giant elm trees that form a canopy over the entire yard. Among these are the stones that mark the burial places of Governor William Blount, and of Samuel Czr. Carrick, first pastor of the church mentioned.

In 1844, the Rogersville Marble Company sold out to Orville Rice, a Yankee clock peddler, and he began to push the introduction of the marble. Engaging a marble cutter, Mr. Rice began the erection of what he styled "Marble Hall." The farm on which his quarry was located adjoined the stage road, and here he erected a large brick tavern, the interior of which was richly and profusely ornamented with marble mantels, shelves, steps and wainscoting.

The house still exists as he left it, but is now a private residence. But the most important thing Mr. Rice did to spread the introduction of Tennessee marble was the sending of a block of the "light mottled strawberry variety," as he termed it, to the Washington monument. This block was inscribed, "Hawkins County Block," and another, sent by authority of the Legislature, was called the "Tennessee State Block." These blocks were boated down the Tennsssee river to Chattanooga, and thence forwarded by rail to Washington. These blocks attracted the attention of the building committee of the National Capitol, and they decided upon this marble for the interior finish of a part of the capitol building. The contract for this work having been secured by Hugh Sissons and Wm. Dougherty, of Philadelphia, Pa., they opened a quarry on a large scale about nine miles southwest of Rogersville. Primitive indeed were the methods of quarrying at that time—hand-drill and blasting. No derricks were used, and all the stones were rolled out of the quarry, hauled by mule teams to the Holston river, down which it was carried by flatboats (when there was water enough to float them) to the Tennessee river, and thence on to Chattanooga, where it was loaded on the cars. Wm. Cannon was the first superintendent of this quarry, which has since become famous in the history of Tennessee marble as "the old Dougherty quarry," but in 1858 James Wright became superintendent; it was under his management that almost all the marble has been taken from that quarry, from 1858 to 1891, and the quarrymen of Tennessee look upon him as the pioneer of Tennessee.

There is no scarcity of marble; you could not exhaust it in a thousand years. No coring has ever been done, but there are immense bluffs of marble exposed to sight, such quantities that even with the most improved machinery would require years to exhaust.

Rogersville is the county seat of Hawkins County, and it deserves notice as being the center of the beginning of the marble production of Tennessee. The town is connected by railroad 14 miles long, which connects with the Southern Railway at Rogersville Junction.

At one time twenty quarries were in operation in Hawkins County, and Rogersville was the logical center of the industry.

Mr. John Hasson opened the "Cave quarry" about 1857, and this was the next one opened after the Dougherty quarry, and here was put up the first derrick used in Tennessee quarries. Mr. Hasson was also the first to introduce channeling machines, and placed in the Cave quarry the first one brought south of the Potomac river. The first large contract was for blocks for the Baltimore City Hall, and these, like all other marble blocks in those days, had to be hauled to the river and boated down to Chattanooga. But in those times the prices obtained were quite large, and a great deal of the marble from this quarry was sold above ten dollars a cubic foot.

Mr. J. C. Stamps, was one of the early quarrymen of Hawkins County, and operated what is now the Stamps Star quarry, now under the control of Dr. Kerber, of Mooresburg, and the only quarry in operation in Hawkins County. Mr. H. B. Stamps, Dr. J. H. Pierce and Jas. Cooper, all of Rogersville, have been prominently identified with the quarrying interests, but at present their quarries are closed down. Rumor has it that several are about to resume operations, but just at present there are no indications apparent to confirm the report.

As Hawkins County was the first to produce marble, so it was within her borders that the first mill was erected. It was a small affair, as the building, which is still standing, gives evidence, but it paved the way for the extensive ones that are now located at Knoxville, and which will be fully treated of further on in this article. A small steam mill was erected some years ago at Rogersville, but the proprietors became financially embarrassed, and it is now operated only occasionally, and then under lease. A sale of the property is soon to be made, and the organization of a company to purchase and carry it on is being agitated.

Although to Hawkins County belongs the credit of introducing and building up the Tennessee marble industry, yet strict truth compels the statement that the present condition in that county is one of almost absolute suspension. Twenty quarries were in active operation some years ago; now there is but one that makes any claim to operating. There are two causes for this. One is, that the popular fancy has turned from the variegated, chocolate and white marble of this county to the more subdued pinks and grays of Knox, Blount and Union Counties. The Hawkins County product was used largely in furniture manufacture, and since the demand for marble-topped furniture has diminished, the demand for the stock from these quarries has been greatly lessened. But the principal cause of the decline is the want of shipping facilities. There is not a quarry in Hawkins County nearer than two miles from a railroad, and most are from five to eight miles away. The enormous expense that must be incurred in teaming the marble over the mountain to the nearest railways acts as an almost absolute preventive to this marble being put in competition with that of other counties, whose quarries are almost universally located near the railroad tracks. Why no railroad has been built through this region is a matter of wonderment. Almost every one of the quarry openings extend along a valley running in a northeasterly and southwesterly direction for a distance of twenty miles. A railroad starting from Russellville, or Whitesburg, could be built with very little grading and the construction of one bridge over the Holston River, a railroad that would not only recive the product of all the quarries, but also of the immense lumber shipments that could be made from the forests that abound in the valleys and on the mountains adjacent. It would seem that here is an opening for enterprise and capital that is not to be overlooked.

Three and one-half miles east of Knoxville the Holston and the French Broad rivers unite, and from thence onward the stream is called the Tennessee. In close proximity to this point of meeting the first work of any magnitude was done among the Knox County marbles. It having been decided to erect the Knoxville Customhouse and Postoffice from marble from the adjacent region, and the United States Government having assumed the contract, a quarry was opened in 1872, near the junction of the rivers. A small mill was also erected on the bank of the river, and here all the material for the building was gotten out and sawed. Mr. George W. Ross, of Athens, Tenn., was appointed paymaster of the building, and served in that capacity until its completion. He then, in partnership with William Patrick, of St. Louis, organized the Knoxville Marble Company, and purchased the site of the government quarry and the mill. Other marble lands were added from time to time and the business pushed forward with energy. Agents were appointed in the principal Northern cities, which was a new thing in the Tennessee marble business, and resulted in making large demands for the company's product. During the twelve or fifteen years the quarry was worked it produced a great deal of marble, both gray and light pink varieties, and among other buildings furnished about one hundred car loads for the New York State Capitol at Albany. The quarry was worked backward from the river bank several hundred feet, and the excavation was made that reached a depth of twenty-five feet below the level of the river. The marble from the quarries was all sent down the river on flatboats to Knoxville, and thence forward by rail. At the death of Mr. Ross, which occurred in January, 1891, he stipulated that the quarry properties should always remain in the family, as he regarded it as something that would continually increase in value. Mr. Ross and Mr. J. J. Craig are considered the pioneers of the business in Knox County, Mr. Craig beginning business very soon after the organization of the Knoxville Marble Company.

The State Geologist, in one of his reports, states that the marble fields of East Tennessee originally covered an unbroken area twenty miles wide and more than a hundred in length. Knox County is not far from the center of this district, and to this fact and the superior shipping facilities may be attributed the very large number of quarries that have been opened in that county. Among these, as in everything else, some have been failures, and some most successful; some have been well managed and others mismanaged. A complete list of all the ventures made would not be interesting even if it could be obtained, but those which have attained the greatest degree of success are known as the "McMullens," "Williams," "Godfrey's Gray Knox," "Rosebud," "Old Government," "Stinette," "Bond," "Great Bend," "Old Concord," "Kincaid," "Republic," "Willard," "Cedar Bluff," "McMillan's," "Caswell," "Craig's Coral," "Brown's," "Nicholson" and "Stevenson."

The variety of colors produced from these various quarries embrace grays, light pinks, dark pinks, buffs and drabs. The prevailing demand for light colored marbles has caused a temporary suspension of work in some of those mentioned that produce the darker varieties, but it is the universal opinion that some day they will again be worked to their full capacity.

In the "forks of the river" region, above mentioned, are located a number of the quarries. Godfrey's Gray Knox is farthest removed to the east. About half a mile to the west, and on the same strata, is the Willard quarry. The Ed Ross quarry, adjoining the old Government quarry, is still further to the west. What is known as the Convict quarry, having been worked by convict labor, but now abandoned, is still further on the road to Knoxville. Below the forks are two quarries owned by the Tennessee Producers' Marble Company, where many improvements and extensions are now being made. From one of the openings, locally known as the "Williams" quarry, was taken the stone that entered into the building of the Memphis Custom-house. A large excavation has been made here, differing from most Tennessee quarries, in that it was made downward, the prevailing plan being to go into the hillside on a level with the valley. The new owners of the Williams quarry have commenced operations at the top and adjoining the old opening, and will work downward, as was done before. Several miles to the south, and across the Tennessee River, are the extensive quarries of John M. Ross. Here is a mountain of marble, varying slightly in color, but principally of the light gray and pink varieties. All of these quarries make use of the river to boat their product to Knoxville. Tramways lead from the quarry derricks to loading derricks on the river banks, and steamboats tow the barges back and forth to Knoxville.

Within a radius of a few miles from Concord, about twelve miles southwest of Knoxville, are also to be found a number of quarries—the old Concord, Stinette, Cliff and Republic—all of which have produced much marble, and will continue to do so for ages. A small mill at one time was in operation at Concord, but it was destroyed by fire and never rebuilt.

Near the north bank of the Tennessee river, which at this point divides Knox and Blount Counties, about six miles directly south of Concord, are the Bond and Great Bend quarries, of the Tennessee Producers' Marble Company. Three openings have been worked in the Bond, and another is now being made. There are immense ledges both in this and the Great Bend, which is on a high bluff overlooking the river. The stone, which is very accessible, is of the pink variety, and is brought to Knoxville by boating up the Tennessee. Marble Bluff, an immense precipice over 300 feet in height, and all of marble, rises perpendicularly just west of the Great Bend quarry.

Directly opposite this quarry, across the river, in Blount County, is the new opening of the Royal Tennessee Marble Company, which is on the immediate bank of the river; in fact the waters wash the base of the marble cliff on which the quarry is being opened. Here, also, within a short distance, is the old Juinetta, the W. H. Evans, and the Dr. Copley openings, now abandoned. Southward from Louisville, which is the nearest railroad point, is the Coral Reef quarries, the Louisville Marble Company's, Knox's, Beach's, and Woods & Stamps'. Excepting the Louisville Marble Company and the Knox, all are idle at present. Not far from Friendsville, on the line of the Marietta & North Georgia Railroad, are the two quarries of the W. H. Evans Company, one of which produces a dark and the other a light pink marble. It is adjacent to this same line of railroad, and about six miles further to the southwest, that the new "Virgin" quarry of the Hart-Godfrey Marble Company is being opened. The marble here is of a very light color, and will be known as "White Tennessee." The supply at this point is without any practical limit, and the company are placing the most recent and improved machinery in this quarry, with a view of being able to quarry marble in great quantity.

In Loudon County are the old openings of the Loudon Stone and Marble Company, the Woods quarry, and several others which have been prospected. One quarry, also, exists at Athens, McMinn County, one near Sweetwater, Monroe County, and one in Bradley County, near the Blue Spring Station; but none of these are being operated at present.

Northward of Knox County, at Luttrell, Union County, is the quarry of the Republic Marble Company. Here is an inexhaustible supply of the gray and pink varieties, under the control of this company. They are very fully equipped for the handling of their product, and have an unlimited field to draw upon.

The Columbia Marble Company's quarry, at Powder Springs, Grainger County, produces large blocks of a dark-colored marble, and is conveniently located very close to the railroad.

All the marble mills in active operation are centered at Knoxville. The one before mentioned, located at Rogersville, is operated but occasionally, and one at Loudon, the property of the Standard Stone & Marble Co., has been closed for several years. The first mill put up at Knoxville was erected by Beach & Pittman. It was a small affair of four gangs, and was soon followed by the Evans Marble Company with one of larger capacity and more improved machinery which has been constanty added to. The mill of the East Tennessee Stone & Marble Co., was the next built, and has been busy ever since in the manufacture of the finished product. The mill of the Knoxville Marble & Stone Co., on the banks of the Tennessee river, came next, and lastly the twenty-four gang mill of the Tennessee Producers' Marble Co. As our readers will perceive, the present activity in the East Tennessee marble regions is confined to the counties of Knox, Blount, Union, and Grainger, with a little being done in Hawkins County. Undoubtedly the quarries now in operation can produce a great amount of marble, and in blocks of any desired size, but the lack of improved machinery and apparatus is noticeable in very many of the quarries. Why this should be so, with the capital at command, and the general business energy of the quarry owners, seems difficult to understand. The mills are well equipped, yes, more, they are fully equipped with every variety of machinery for the most rapid handling of their work, but so much cannot be said for the quarries, taken as a whole. Of course the business is young. Tennessee marble had only passed its infancy when the stagnation of all business occurred, and this industry suffered with the rest. From that time to the present year the facilities for quarrying were more ample, but the day is not far distant when they will be entirely inadequate, and must be replaced with machinery capable of more rapid work. This is apparent to the quarry owners, and within the past month several orders for channeling machines and steam hoists have been placed. The new quarries opening are placing the most labor-saving machinery into their possessions, for while manual labor is cheap around Tennessee quarries, speed must be attained, and speed can only be had in quarrying work with good machinery.

Geologically considered, the East Tennessee marbles can be referred to the Trenton or Nashville series, which are the overlaying beds of the lower Silurian formation. These series are divided into two members, the blue limestone being the lower and the calcareous shale the upper member. Between these are the marbles. All these formations strike northeast and southwest, and vary from horizontal to dips of high angles. First in order is the Knox dolomite, and next the blue or Lenoir limestone, or as it is commonly called, "rotten stone." Next to this is the gray and then the pink marbles. Of the colored marbles there are an almost infinite number of shades—from the delicate "Maiden's Blush" to the rich dark brown or chocolate of Hawkins County, and from the attractive "McMullen Gray" to the strong "Variegated" and "Dark Knox." This great diversity extends to the texture as well as color, and the widest possible field is afforded architects for the exercise of taste and the production of effects in the selection and combination of Tennessee marbles. It is only of late years that this diversity in these marbles has been known, and the popular knowledge of them is largely confined to the dark variegated varieties so much in vogue some years ago in the manufacture of furniture. As a matter of fact they are not the best sources at the present time from which a correct estimate of the marbles of this section can be formed. The lighter grays and pinks, meeting the popular fancy, and being attainable in larger and more perfect blocks, must be considered as the standard from which Tennessee marble is to be judged.

All building stones must be primarily classified according to strength and durability, these being their necessary requirements. They may then be further classified as to beauty, both of color and texture, and susceptibility to receiving and retaining a polish or finish. The strength of stone upon the closeness and compactness of texture, the degree of consolidation, and the hardness and cleavability of grain. Numerous tests of the crushing strength of

Tennessee marble have been made at various times, and all show it capable of sustaining a very high degree of pressure. Col. J. E. Hart, of the East Tennessee Stone & Marble Co., has a test of four samples by Riehl Bros. Testing Machine Co., May 28, 1895:

VARIETY.	SIZE IN INCHES.	BROKE AT
Pink Tennessee........................	2.011x2.009x2.011	63,160 lbs. pressure.
White Tennessee........................	2.013x2.014x2.012	68,850 lbs. pressure.
White Tennessee........................	2.013x2.003x2.013	65,400 lbs. pressure.
White Tennessee........................	2.014x2.015x2.013	59,250 lbs. pressure.

These tests are no higher than others that have been made on samples of the same apparent quality, and are proof, especially, when taken in connection with the absorption tests mentioned in Prof. Ferris' article, of the durability of Tennessee marble for exterior building purposes. The fact that many marbles, particularly the Italian, are so porous that a drop of oil or ink will be at once absorbed and the marble ruined, has sometimes deterred marble from being used in places where it otherwise would have been adopted. Tennessee marble is practically impervious to staining or discoloring agencies, and, as a rule, acid alone affects it in any perceptible degree. These marbles seem to have all the requisites for a satisfactory building material, a material that will last through generations. There is first the strength, then the durability, then the variety, and lastly the capability of being finished to an unexcelled degree of beauty.

The United States government has erected a building at Knoxville, the custom-house and post-office, that does credit to these marble products, and there is an old store front on Gay street, built in 1840, of marble said to have been quarried by Wm. Haynes, at the junction of the Holston and French Broad rivers, which shows the lasting qualities of the marble. This store was the popular one of old Knoxville, and an immense business was transacted within it. Despite the tramp of the many feet that have passed over the marble doorsteps in their long years of service, there are no indications of "cupping" and no stains that soap and water will not efface. The stone was not known to be marble in the days of 1840. It was then denominated "white limestone," and at the same time the dark blue limestone was called "black marble."

As the old tombstones of Tennessee marble tell of the early production of the Tennessee quarries, so does the Sevier Monument on the Knoxville Court-house Square, and the Confederate Monument in the cemetery, tell of the present possibilities of light Tennessee marble as applied to monumental work at the present day. The shaft of the Sevier monument and the statue of the soldier on the Confederate monument, are noticeable, the one for its height, and the other as being the largest figure that has yet been cut from a block of Tennessee marble.

The following pages are designed to give a full and authentic description of the Tennessee marble industry as it exists to-day. While it may be that a greater amount of space than is strictly necessary shall be occupied with the personnel of the various corporations and firms, yet we regard the individuals now in the marble business of this section as but the pioneers of an industry that shall grow and increase until, large as the enterprise now is, the business of to-day shall appear as trifling compared to that which shall exist in the years to come. Therefore, we think it but proper to fully introduce the gentlemen who are opening the way for the great things that are to follow.

Three miles directly east of Knoxville, and not far from the banks of the Tennessee river, is the quarry of Mr. John M. Ross, locally known as the "Island Home Quarry." There rises an abrupt mountain of almost solid marble, and it is on this mountain, or hill, that the quarry is located. About seventy-nine acres are included in the quarry property, nearly all of which is marble land. It was in 1881 that Mr. Ross began operations here. Two extensive openings have been made, and the work of opening the third is now going on. When this is completed this quarry will have a face about 800 feet in length, and a capacity for producing marble proportionately large. The ledges of marble in the mountain vary. At the top they are inclined at an angle of about 45°, but at the base they lie very nearly flat. Three colors of marble are proproduced—a delicate light pink, styled "baby pink," a deeper pink and a gray—each of close texture, and each capable of a high degree of polish. This fact of its beauty of polish has caused the marble from this quarry to be used extensively in the Eastern cities for interior decorations. But very little attention has as yet been given to secure its use in exterior work, but it has been used to some extent around the Memphis and Knoxville custom houses. However, in connection with the other Tennessee quarry owners, Mr. Ross is now calling the attention of architects generally to Tennessee marble as a building material, capable of resisting the elements for all time.

The quarry is equipped with derricks, steam drills and bar channelers, steam hoists, etc., sufficient to average an output of fifty carloads per month of sound shipping stock. A tramway runs from the quarry derricks to the river, and the marble is all sent over this tramway, loaded on barges and taken to Knoxville, where the loading derricks take it from the boat and deposit it on board the cars.

The Republic Marble Company is regarded as one of the most progressive and enterprising quarry organizations to be found in the marble district of Tennessee. Though springing from a comparatively small beginning, by live and energetic management, always alert to adopt the latest and most improved quarrying methods, the past business history of this company has been marked by a gradual but steady increase that cannot fail to retain for it in the future its present place in the front rank of the marble companies of this noted section.

The Republic Marble Company was organized in the month of June, 1886, under the laws of the State of Tennessee, with its main office in Knoxville, and commenced business at once with a quarry located in Knox County, upon the line of what was then the East Tennessee, Virginia & Georgia Railroad, near the town of Concord, and eighteen miles south of Knoxville. For nine years work was continuously carried on at this point, producing a very fine and saleable grade of pink and variegated marble, that found great favor with the trade generally. In the month of June, 1892, the present Luttrell quarry was purchased, situated in Union County, within three-quarters of a mile of the main line of the Knoxville, Cumberland Gap & Louisville Railroad, one mile from the town of Luttrell, and twenty-five miles north of Knoxville. To this place most of the company's plant was at once removed, and, though their main operations are carried on at this point, work still goes on at the Concord quarry in order to supply the demand for that stone.

At the Luttrell property there is a fine ledge, or, rather, three distinct ledges of marble, separated about 400 feet apart, but running parallel and cropping out boldly for several miles along the steep sides of a hill. One ledge is a fine gray marble, and the other two of beautiful pink and variegated. The Republic Marble Company owns and controls not less than 550 acres of land, extending for upwards of two miles along the best part of this marble deposit, which has already proved to be practically inexhaustible. In the quarry now working, the ledge has an average width of 160 feet between walls, dipping at an angle of 38 into the side of the hill, and laying in a position most easy of access, and convenient of working. The marble produced is the finest grade of pink and variegated, with good, bold figure, taking a polish of exceptional beauty and finish.

The present machinery equipment of the company consists of two Sullivan channelers, one Sullivan gadder, four Rand mills, three Ingersoll drills, five derricks and two steam hoists, with boiler capacity of 150 horse power. The quarry is connected with the main tracks of the Knoxville, Cumberland Gap & Louisville Railroad by three-quarters of a mile of track, standard guage, by which cars are conveniently placed within easy reach of the derricks, and blocks are rapidly loaded and shipped direct to all parts of the country.

The present officers of the Republic Marble Company are as follows: Frank S. Mead, President and General Manager; Edwin H. Eaton, Vice-President and Superintendent; and William S. Mead, Secretary and Treasurer.

Arrangements have been made for, and work has commenced on a steam saw-mill, to be placed close to the quarry, with everything of the latest and most approved pattern, with four gangs of saws, rubbing beds, etc., etc., so that in a few weeks they will be able to furnish dimension stone of all sizes for building purposes of every description.

The East Tennessee Stone and Marble Company is organized under the general incorporation act of the State of Tennessee, with a capital stock of $100,000.

Officers: J. E. Hart, President, Treasurer and Manager; James Wright, Vice-President; and C. M. Funck, Secretary and Superintendent.

The finishing plant, while not the largest, is one of the most complete in the country. At present their equipment consists of six gangs of saws, two large fifteen foot planers, three rubbing beds, circular cutter, lathes, countersinking and polishing machines, and an air compressor running four pneumatic cutting tools. A recent addition has been a complete outfit of machinery, operated by an independent steam engine, for the manufacture of marble mosaics. This innovation, for such it was among the Tennessee marble mills, is proving quite successful. Several large contracts are being cut and set, and the demand for the cubes is on the constant increase. Eight colors of marble mosaics are easily furnished—colors which are nowhere exceeded in beauty, and the wearing qualities of which, like the marble from which they are made, cannot be exceeded.

In the finishing rooms of the company is a large force of experienced workmen at work on beautiful and intricate carvings and highly-polished effects for interior decoration. A particular stress is laid upon the necessity of finely-finished work, and careful inspection is made of everything before it leaves the mill. The elaborate marble work in some of the buildings mentioned further along in this article give proof of the care with which the work is executed.

The company's mill is run 24 hours each day—144 hours per week—and has been doing so for several years, with the exception of three or four periods of short duration. All through the long business depression which is now so happily disappearing, the East Tennessee mill was kept steadily running, and plans are now being made to greatly enlarge the facilities, something that will be soon demanded, as business is increasing and the present plant will be too small to meet the extended rush of work.

It is a fact that must be thoroughly understood among architects and builders, that while Tennessee marbles are unsurpassed for fine exterior building purposes, their resistance to moisture and crushing strength are greater (as our tables show) than other marbles, and superior to granites. That they have not come into more general use sooner is to be accounted for by the fact that, until a few years ago even the people engaged in the production of Tennessee marbles did not realize what grand building materials they were. The trade wanted colored marble for interior decoration and furniture tops, and the quarrymen bent their energies to supplying the demand, in the meantime overlooking the matter of exterior work. Then when they did realize the importance of their product for exterior work, the depression of business followed, and there was no demand. Now, when prosperity is returning and new buildings are being erected, the producers of Tennessee marble intend to let it be known and understood that they have a superior material for such purposes. The Blackstone Memorial Library, at Branford, Conn., built of marble furnished by this company, is a fine example of its adaptability for this purpose.

The product of this mill goes to all parts of the United States from Maine to California. It is to be found in many of the finest buildings of the country, as the following list of a few among the number furnished with Tennessee marble by this company will show:

In Chicago—Dexter Building, University Club, Imperial Hotel, Vendome Hotel, Renfost Hotel, Mecca Hotel, Rainer Hotel, Brooks Apartment Building, Thomas Apartment Building, Rickerts Flats Building, Evanston Avenue Flats Building, Colton Flats Building, Lawless Flats Building, La Berge Hotel; Blackstone Memorial Library, Branford, Conn., exterior and interior; in St. Louis—Union Trust Building, St. Nicholas Hotel, West End Hotel, Vandalia Building, Anhauser-Busch Building; Fort Worth, Tex., Court-house; Laporte, Ind., Court-house; Monmouth, Ill., Court-house; Nelson Hotel, Rockford, Ill.; President H. H. Porter's residence, Geneva Lake, Wis.; Gay Building, New Haven, Conn.; Chattanooga and Birmingham government buildings; Lynn residence, Eleventh street, New York City, exterior; Four Seasons Hotel Sanitarium, Harrogate, Tenn.; Union Depot, Louisville, Ky., and many others.

The Tennessee Producers' Marble Company, with mills and offices at Knoxville, Tenn., has for its officers the following gentlemen: W. B. McMullen, President; John P. Spaulding, Vice-president; Tully R. Cornick, Secretary; J. B. Jones, Assistant

Secretary. The directors are: Redfield Proctor and E. R. Morse, of Proctor, Vt.; John P. Spaulding and W. S. Spaulding, of Boston, Mass.; John H. Knox, Tully R. Cornick and W. B. McMullen, of Knoxville, Tenn.

Their mill capacity consists of twenty-four gangs, and they are the owners of twenty-two quarry properties, embracing the celebrated McMullen gray, Bond, Imperial, Great Bend, Rosebud, Cottrell Coral and Cloyd's Creek, the properties being situated in Knox, Blount, Loudon and Grainger counties, and they control, under contract, the sale of the product of J. E. Ross' Maiden's Blush quarry and Knox's Second Tennessee.

In 1878 J. J. Craig & Co., a firm composed of the late Col. John J. Craig, W. B. McMullen, the present president of the company, and J. M. Edington, opened a quarry in Knox County. This firm were pioneers in business in this immediate vicinity. In 1884, other properties having been acquired, the firm became incorporated as the Great Southern Marble Company. In 1889, prior to which date W. H. Evans, of Baltimore, had erected a mill in Knoxville and opened quarries in the vicinity, the Tennessee Producers' Marble Company was formed, the primary object of the company being to market, as sales agents, the product of J. J. Craig & Co.'s and W. H. Evans & Sons' quarries. Under this ownership the celebrated Bond and Great Bend quarries were acquired by the Producers' Company.

In January, 1893, the interests of the Messrs. Evans were acquired, and Messrs. Proctor, Spaulding and Cornick entered the company. The individual holdings of Messrs. Craig and McMullen, and the corporations controlled by them, were then conveyed to the Producers' Company, and the Great Southern Marble Company, Rosebud Marble Company, etc., were liquidated. In 1894 the mill was erected, and in 1895 the Williams quarries were acquired.

Marble from the quarries now owned and operated by this company was used in the interior finish and decoration of many of the important buildings in the United States erected within the past twenty years, notably the Equitable Life and Mutual Life, New York; the Penn Mutual Life and City Hall, Philadelphia; Adams House, Boston; New York State Capitol at Albany; Congressional

Library, Washington; while its gray quarries furnished the marble for the walls of the Memphis Custom-house and for the Lee monument at New Orleans.

Tennessee marble is an ideal building stone, its density and crushing resistance being greater than that of any marble produced in the world. The quarries owned by this company are of uniform color and soundness, and will match so as to give an assured artistic effect.

The company is adding new machinery and equipment to its various quarries, and guarantees that it will make any expenditure which may be required to meet promptly all demands for its product. It sells the product of its quarries and mills preferably in car load lots, to the trade only, and does no contracting or finishing except in tiles, turned work and bed rubbing. It produces and sells blocks, monumental stock, dimension stone, slabs, coped stock, turned work and tiles, and will furnish yard room and shipping facilities free to contractors using its product.

The quarries of the Knox Marble & Railway Company are located at Carpenter, Blount County, Tenn., and their office is at Knoxville. John L. L. Knox is President; J. McF. Carpenter, Vice-president, and John H. Knox, Secretary and Treasurer. The company owns the celebrated French Hill quarries, and in its purchase and development has expended $50,000.

The product of the quarry is a high grade variegated marble, and classes as a strictly uniform and sound Second Tennessee, and more nearly approaches the Hawkins County marble than anything produced in the State outside of that county.

What are known as the Louisville Marble Quarries are located at Louisville, Blount County, Tenn., on the Marietta & North Georgia Railroad, fifteen miles southwest from Knoxville, Tenn., where Mr. J. Oellig Brown, who operates these quarries, resides. They produce three varieties and are known as "Nub Argent," "Dark Variegated" and "Light Pink" marbles. The "Nub Argent" is a new product of Tennessee marbles, and has met with much favor for wainscoting and other interior work, where a light effect is desired.

Mr. Brown has been constantly engaged in the development of marble properties and the quarrying of marble up to the present time. He has been interested in the opening of many of the most successful projects, and is quoted as good authority on all questions pertaining to marble and marble quarries. His Louisville quarries, which lie on the side of a high hill, show a large deposit of marble of the varieties named above, the "Nub Argent" (Silver Cloud) predominating. A great deal of stripping has just been completed for the purpose of enlarging the quarry, employing a greater number of men, and consequently being able to keep pace with the increasing demand which is being made for this marble. The shipping facilities, by reason of the proximity to the railroad, makes it possible to fill orders without delay, and the nearness of the quarries to Knoxville makes it possible to put the loaded cars in the yards of the various transportation companies within two hours after they leave the quarries.

The Evans Marble Company is located with its main office and principal mills in the city of Baltimore, Md.

This company has large interests in the State of Tennessee. In Hawkins County, Tenn., they own one of the largest and finest quarries of marble in that section. This quarry they have operated for the last twelve years very successfully, and it is conceded that the varietes and colors which they quarry are of the very finest of Hawkins County marble for interior work. In the city of Knoxville they have one of the largest and finest equipped marble mills in the United States, the mill building being 300 feet long by 60 feet wide, and of three stories. This building is equipped with twenty gangs of saws, all the modern machinery of every kind, is lighted up with electric lights, and employs constantly in the mill 160 workmen. Here they have turned out the marble for the interior finish of hundreds of the finest buildings throughout the United States. They are also thoroughly equipped, and have a daily capacity of 100 plumber slabs, which they ship to the wholesale plumbers throughout the country. Their shipments extend from Maine to Texas, and from ocean to ocean. Within the past year they have shipped to the Pacific coast over 20 car loads of marble.

In the city of Chicago, where they maintain a permanent office, they have a very large and growing trade. A few of the buildings there for which they have furnished the interior work are as follows: The Masonic Temple building, the Art Institute building, the Rand-McNally building, the Manhattan building, and a score of other buildings. In the World's Fair buildings, they furnished for use during the fair five carloads of finished marble, which were put up, and used by thousands of people in the toilet rooms of the different buildings.

Knoxville, East Tennessee, being the center of the marble trade for Tennessee, they own and control twenty different pieces of marble property, several of which they have in successful operation, and from which they quarry all of the different varieties of Tennessee marble, and for which the Knoxville mill is famous for finishing and turning out.

In their various quarries they employ from 150 to 200 men constantly the year round, with all modern machinery, and with facilities of their own they quarry and consume over 50,000 cubic feet of Tennessee marble each year.

One of the quarries, which is producing the gray and light pink varieties, is located in the famous "forks of the river" section, about three and one-half miles directly east of Knoxville. Here are the typical formations of Tennessee marble. Great ledges, one above the other, lie piled high above and back of the present opening, giving assurance of the almost inexhaustible supply.

Directly opposite the quarry, on the banks of the river, are the loading derricks for putting the marble on the flatboats that carry it to the city of Knoxville. A tramway runs from the quarry derricks to the banks of the river, and over this passes all the marble taken out of the quarry. At Knoxville other derricks lift the marble directly on the cars for transportation to any desired point. Before the introduction of the train derricks it was a costly matter to haul the stone from the river to the mill or railroad, owing to the hills encountered on the streets of Knoxville; but that has been obviated by the railroad tracks now running directly to the river's banks.

The quarries of the Evans Marble Company, in Blount County, are also producing a large amount of marble. Two, or rather four, quarries are in operation here, each quarry having two openings, widely separated, and producing a different color of marble. Out from the rocks in this section, which lies so quietly away from the busy world, is being taken the marble that adorns some of the great buildings of the country. It is here that some of the ledges are to be found, and while the masses are not piled as high as at some other points, yet they reach over a great extent and are easily accessible. The Marietta & North Georgia Railroad, which passes through the marble belt of Blount County, affords means of egress for the product of these quarries.

These marbles are rapidly growing in favor among architects, contractors and builders, on account of their beauty of texture. The varieties of colors can be used to cast beautiful effects which architects wish and require in their work.

This company quarries from their own quarries six distinct colors of marble, which are conceded by the trade to be of the finest grades of Tennessee marble upon the market to-day. They are prepared at any time to forward to architects or contractors samples of these different marbles, so that they can make their selections, either of the dark, the gray, or the pink varieties.

Thomas Brown and J. W. Harvey opened the Holston River Marble Quarries in 1879. In 1886 these quarries were sold for division after Thomas Brown's death. T. S. Godfrey was bookkeeper for the firm; in 1881, in company with Thomas Brown (since deceased) and James Wood, he became engaged in opening the famous Concord quarries, now being operated by Messrs. Hart & Kellar.

In the year 1885, he, with R. H. Brown, T. W. Keller and J. Oellig Brown as partners, opened the Great Bend quarries on the Tennessee River, about twelve miles west of Knoxville. During same year, in company with Mrs. Thomas Brown (since deceased), of Youngstown, O., and R. H. Brown, he opened the Bond quarries. These two latter plants are now operated by the Tennessee Producers' Marble Company.

In the year 1887 Mr. Godfrey opened the "Stinette." These quarries are well known throughout the trade as productive of a very fine colored marble, one of the best in Knox County. He had associated with him in this plant W. H. Evans, of Baltimore, and E. S. Rogers. In 1889, with W. R. Monday and Harmon Kreis, he opened the "Gray Knox Marble Quarries," and has since purchased the interests of his partners in the "Stinette" and "Gray Knox," and is operating alone. The past year he secured a valuable deposit of white marble in Blount County, and with Col. J. E. Hart, President of the East Tennessee Stone and Marble Company, of Knoxville, as associate, there has recently been begun extensive operations on what Mr. Godfrey claims will prove to be the most productive quarries of the best and finest building marble in the known world—white Tennessee.

This new firm, under the title of the Hart–Godfrey Marble Company, has leased about 75 acres near the line of the Marietta & North Georgia Railroad, in Blount County, and are now actively operating. Practically, there is no stripping whatever to be done, and the marble is solid from the top down, even the boulders on the surface being convertible into sound blocks. Improved quarrying machinery has been put in position, and all arrangements made to produce the marble on an extensive scale. A large quantity has already been taken out, and work is being continuously pushed. The proprietors report that their expectations are being more than realized, both in regard to the color and the quality of the marble—the quantity was never questioned. Now that so many of the Tennessee quarrymen are using every effort to find and develop the light-colored marbles, the Hart–Godfrey Marble Company are particularly fortunate in being able to place on the market a "White Tennessee" marble, what they declare is the lightest colored of all Tennessee marbles now quarried, and to which they particularly invite the attention of architects, as the marble is without doubt a building material of exceptional value.

The facilities for shipping are not excelled anywhere. The company controls the land along the railroad track, and a depot, with the necessary accompaniment of sidings and switch tracks, is about to be placed on their property to enable them to make prompt shipment of the large amount of their product which it is expected to turn out. As the marble is so well adapted to building purposes, a special effort in this line is being made, and will no doubt result in large quantities being demanded, and it is to meet such demand that the complete railroad shipping facilities are being added.

The Tennessee quarrymen are desirous that architects should be more particular in specifying the quality of marble to be used in their buildings. The general specification of "white," "pink," or "dark," no longer specifies anything. Among the many colors now produced there is a wide range of choice. There are any number of light colored marbles, and any number of both pinks and dark colors. Some one particular brand should be decided upon, and proposals asked for on that brand. The indiscriminate way of now asking for bids works injury to all parties, and must be remedied in the near future.

The quarries of the Concord Quarry Company, of which Mr. J. E. Hart is President and Mr. T. W. Keller, Secretary, are located at Concord, that old center of the Knox County marble interests, and the general office is at Knoxville. The "Old Concord" quarries are among the best known in East Tennessee, for several reasons. They are among the oldest, have produced an immense amount of marble, and are still in successful operation, producing more massive blocks than ever, and with marble enough in sight to make it practically inexhaustible. The marble taken out is just as sound and uniform to-day as was that quarried a dozen years ago. During the years that the old Concord quarry has been producing marble many quarries have been opened, worked for a short period and then abandoned, but this one has gone on producing its car-load after car-load, year in and year out.

The marble taken from these quarries is noted for its beauty of color and finish, taking a very high polish with the least amount of labor. The variety known as striped pink, when properly matched up, has no superior for wainscoting and similar interior decorative work. Among the many hundreds of buildings into which this marble has gone, the company refers to the St. Nicholas Hotel, St. Louis, as a sample of its beauty and general effect. The red pink variety produced by these quarries is known to all marble dealers in the United States as being a pink indeed which is not surpassed. Just at present some particularly large and fine blocks of this variety are being taken out. Their light pink has been put to government tests on several occasions, and shows that it is a superior marble for exterior work, undergoing a crushing test of 15,633 pounds to the square inch. The absorption test showed it would take up but one part of water to 1,800 parts of marble. It is also desirable as a marble for interior finish when a light effect is desired, and has been so employed on many fine buildings alone, and also in connection with the other marbles produced from these quarries.

The Memorial Library building, at Branford, Conn., is built exclusively, exterior and interior, of marble from the old Concord quarries, and illustrates the different varieties produced. The material, as well as the design and execution of this building, has attracted much attention and favorable comment among Eastern builders.

The Concord Quarry Company are prepared to fill orders for slabs or mill blocks from any of the varieties they produce. The matter of preparing slabs so they can be finished and matched to produce beautiful and regular effects, is given close attention. Some handsome examples of this matching can be seen in the construction of the East Tennessee Stone and Marble Company's office.

The Royal Tennessee Marble Company is among the latest additions to the firms engaged in quarrying Tennessee marble. There are five equal partners in the company, all business men of Pittsburg, Pa., and have abundant capital to push the enterprise to a successful issue. In the organization, Mr. W. B. Enos was elected President; Mr. Hackett, Secretary and Treasurer, and Mr. P. F. Poorbaugh, Superintendent and General Manager.

The office and headquarters of the company are at Louisville, Blount County, Tenn., and their quarries are located about two miles west of that town. Here they have purchased one hundred and one acres, and leased an additional one hundred and forty-six acres of marble land. The north line of this property is along the banks of the Tennessee river, and directly opposite, across the river, are several of the oldest and most successful quarries of the vicinity. The point chosen for one of the initial openings of the Royal quarries is near the river bank, for all along the river frontage of the property the marble rises in huge perpendicular bluffs from the water's edge. The convenience to the river will make the matter of transportation of the marble to Knoxville an easy problem to solve, as it can be loaded directly from the quarry into the boats.

The company, owing to their extensive holding of land, can take out and furnish any of the prominent colors of Tennessee marble, but they have four particular brands, of which samples will be furnished upon application. Among these is a dark blue, something very rare among the marbles of this State, and a marble which seems to be of particular value for monumental purposes, and it is the intention to introduce its sale for that purpose.

THE TENNESSEE PHOSPHATE FIELD.

BY LUCIUS P. BROWN,

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In the introductory remarks to Bulletin No. 46, of the United States Geological Survey, by Dr. R. H. F. Penrose, on "The Nature and Origin of Deposits of Phosphate of Lime," 1888, Prof. N. S. Shaler uses these words, "It will be evident to the reader of Dr. Penrose's report that the workable deposits of phosphates are found in a greater variety of circumstances than those which contain most mineral substances that have an economic value. * * * * * There is no substance of equally wide diffusion, among those of considerable commercial importance, which, in the present state of popular knowledge, so nearly escapes detection as lime phosphate." The facts thus stated, will explain why all the phosphate discoveries, so far made in the United States, have been almost purely accidental. Such was the case in South Carolina in 1867, in Florida twenty-one years later, and in Tennessee in 1893.

In the case of Tennessee the necessarily accidental nature of such discoveries is particularly well exemplified. The phospate rock here was first described by the eminent and gifted Dr. Safford, the State Geologist, in 1869, in his "Geology of Tennessee" as follows: "West of the Cumberland table land, in most of the counties, the formation (i. e. the Devonian shale) does not consist alone of the characteristic black shale. The latter has at its top a thin layer of argillaceous, very fetid, concretionary bodies, which I have sometimes called 'kidneys,' a name which has already been used with reference to them. These bodies are round, oval, kidney-shaped, and usually more or less flattened. They vary in size from that of a peach-stone to thick, cake-like masses two feet across, and occur packed, often closely, with black shale, in a layer from two to twelve inches thick. The kidneys vary in size with the thickness of the layers. In addition to the kidneys at the top, the shale has immediately below it, very generally a dark gray, bituminous, fetid sandstone, usually fine grained, and from a few inches to fifteen feet in thickness. In Wayne, Hardin, and in the southern part of Lewis, this sandstone is often thick enough to be quite conspicuous, forming ledges along the slopes of the hills and sometimes small local plateaus. North and east of Wayne and Lewis the sandstone below the shale is not so thick; in fact, it very often measures but the fraction of a foot."

This description of the physical characteristics of the phosphate deposits is quite an accurate one. That their chemical nature was not discovered at the time is not surprising when is considered the fact that chemists were then few in the State and that this rock differs so totally from the South Caralina deposits, discovered two years before, as not to give even a suspicion of its true nature.

The phosphate has also, (naturally, as will be seen later) frequently been used in building operations requiring stone. Chimneys built partly of it have often been a source of vexation of spirit to the eager prospector, who has searched in vain for the ledge whence the rocks were derived. An object of interest to visitors to the fields, at present is a stone house made almost entirely of phosphate rock, built by an unfortunate, who, becoming crazed upon the subject of religion, and insisting that he had divine commands to construct a house entirely of stone, utilized for this purpose the phosphate ledge near by, easily quarried in regular forms. Additional emphasis is given to the conspicuous part played by chance in such discoveries by the fact that for forty years iron has been made in this region, and the phosphate district has many times been prospected for iron ore, coal, oil, etc.

The nature of the "kidney" deposits has been known for several years, but the discovery of the deposits now worked was made in October, 1893, by a Mr. Harder. Messrs. L. Bates and R. Childs had been, during 1893, prospecting for coal in this section, and Harder, while fishing in Swan Creek, near Palestine, Lewis County, found some (to him) peculiar looking rocks, which he sent to Messrs. Childs and Bates. These gentlemen taking them for indications of coal, sent them to Mr. J. C. Wharton, of Nashville. He found the greater portion of the samples to be black slate, but discovered that one of the pieces was a high grade phosphate rock. Upon receiving his report, Messrs. Childs and Bates went to work obtaining options on land, and other prospectors were soon in the field. By July, 1894, three companies had been organized. Trial shipments of rock went out as early as May of that year, but the first regular shipments were made in July, and by January 1, 1895, 17,384 long tons had been shipped.

GEOGRAPHY.—By far the most important of the deposits so far examined are in the valley of Swan Creek, and Totty's Bend of Duck River. This region may be considered as one field. It extends from near Newburg, in Lewis County, to Duck River, and is about four or five by twenty miles in extent, the long diameter lying approximately north and south. Another and much smaller field exists on Leatherwood Creek, in Hickman County, but this is at present inaccessible, owing to distance from railroads. A good grade of rock has also been discovered in Maury, Giles and Williamson Counties, but its extent cannot be determined without further prospecting. For the most part it lies several miles from railroads.

The accompanying preliminary map (taken from the Sixteenth Annual Report of the U. S. Geological Survey) shows the deposits in the more westerly portion of the field, with the location of the mines now opened.

GEOLOGY.—Unlike the deposits of South Carolina and Florida, which occur essentially as nodules of various shapes, sizes and colors, Tennessee phosphates occur as regularly bedded formations. Middle Tennessee consists essentially of the "Central Basin," which is surrounded and traversed by ranges of hills. The rocks of the Basin proper consist of limestones, almost entirely of "Trenton" age. The hills surrounding the Basin are called the "Highland Rim," and it is in the western Highland Rim that the counties of Lewis and Hickman lie, as do parts of Maury, Giles and Williamson. The cap-rock of the Highland Rim belongs to the Siliceous group of the Lower Carboniferous, consisting of cherty limestones and calcareous cherty shales. This formation is usually several hundred feet thick. Next below it come the Devonian rocks, consisting of an upper layer (described further on), in which the kidneys for the most part occur; below this the "Chattanooga" black shale, and the phosphate layer, the latter usually forming the lower member, though sometimes they are much interbedded. These rocks are usually thin, rarely running over fifteen feet in thickness (of which the black shale occupies by far the greater part), and rest conformably upon the Silurian rocks, Upper or Lower, the former often being absent. The Devonian formation is very persistent throughout the State, and the phosphate layer, or its representative, almost invariably accompanies the black shale. As already mentioned, Swan valley seems to be the center of the best deposits. Going west or southwest from this section, the phosphate gradually becomes more and more sandy, until, on Brushy Creek, in Perry County, it becomes a ledge of sandstone, some four feet thick. Going east of Swan Creek, similarly, the proportion of sand, and especially of shale and calcareous material, increases, and the ledge likewise seems to become thinner.

PHYSICAL CHARACTERISTICS.—The Tennessee phosphates divide themselves naturally into five classes: (1) the nodular; (2) the Devonian bedded; (3) the white breccia deposits; (4) the white bedded deposits; (5) the Silurian beds.

(1). The nodular phosphates, or "kidneys," have been described above. They usually occur in a well-defined layer of varying thickness at the top of the black shale, imbedded in a greenish shale, which Mr. C. W. Hayes (a[1]) suggests is probably a volcanic ash bed. Sometimes, however, they are distributed irregularly through the black shale, and similar nodules are sometimes found in the bedded deposits. The nodules usually have a black or very dark gray color, which is due to a large proportion of organic matter. Their concretionary structure is well marked, especially upon weathering slightly. They run in content of bone-phosphate from 55 per cent. to 74 per cent., and are an excellent material for the manufacture of acid phosphate, but the small supply does not warrant mining them alone.

(2) The bedded Devonian rock may be divided in a general way into two main varieties, the compact (fine grained) and the oolitic. These again may be divided into the blue (or blue black) and the gray. The blue so much exceeds the gray in quantity that it may be taken as the typical color of Tennessee rock. Oolitic blue rock shows to the eye a coarsely granular structure, which under a hand glass is seen to be due to numerous small rounded or flattened grains,

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(a[1]) Sixteenth Annual Report of the Director of United States Geological Survey.—*Mineral Resources of the United States.*

with glazed surface, and to many shell-casts, usually of a Cyclora. This oolitic rock shades by degrees into the compact, fine grained variety. The latter is usually higher in bone-phosphate than the oolitic rock, and so far the quantity of each of these varieties seems, curiously enough, to be much larger than the quantity of any rock intermediate in structure between them. The blue rock ranges as high as 80 per cent. bone-phosphate, and the unaltered rock usually contains from 1½ per cent. to 3 per cent. iron and alumina; it also contains pyrite and 3 or 4 per cent. of organic matter. The blue color is due to the latter, and the oxidation of it and the pyrite on the outcrop, or along the joint planes of the rock, has replaced the original blue color by a reddish or yellowish brown, or a gray, the color varying according to the amount of pyrite originally present. This change of course increases the percentage of iron oxide, but the proportion of changed material is usually quite small, especially when a good slate roof overlies the bed.

Rich oolitic gray rock is so far found only in Totty's Bend. Its oolitic structure is better marked than that of any other rock in the field, and it contains more shell-casts. It has little pyrite. Analyses by Bernard Dyer showed as an average of two samples, 74.42 per cent. bone phosphate and 2.12 per cent. iron and alumina. At one of the mines in Totty's Bend this gray deposit forms the upper portion of the stratum, the lower consisting of a blue oolitic phosphate, running about 5 per cent. lower in bone phosphate than the gray. This is the only place in the field where such a formation occurs, although it is unusual to find all the rock (in a vertical direction) in any one mine the same, there being most often two or more distinct seams in the bed, though one or more of them may be quite thin, and therefore unimportant.

The fine grained, compact gray rock is probably of a more uniformly high grade than any of the others. It is, however, so far found only in comparatively thin seams, and is not general in its distribution; therefore it has not been so extensively opened as the blue rock, and is consequently less known. It runs from 75 per cent. to 84 per cent. bone phosphate, and has not an excessive content of iron and alumina.

The beds of all varieties of the bedded Devonian rock occur of varying thickness, but at present no seams of less thickness than about 18 inches are worked, although it seems possible under exceptionally favorable circumstances to mine a less thickness. No rock of less than 60 per cent. bone phosphate is now shipped from the field, although of a grade less than 60 per cent. there is a very large amount. The principal impurities in this low-grade rock are sand and limestone; the former in much more considerable amount. As it reaches in some places as great a thickness as six feet, it may be possible, on account of the cheapness with which it could be mined, to utilize it by manufacturing at the mine, if cheap transportation could be provided. It seems unlikely, however, that this will be done in the near future.

(3) The white breccia deposits, and (4) the white bedded deposits, have been very well described by Mr. C. W. Hayes (Transactions American Institute, Mining Engineers, March, 1895), to whom I am indebted for most of the information regarding them. The breccia deposits lie in Perry County, and are most highly developed on Tom's Creek. The deposits here consist essentially of small, angular fragments of carboniferous chert imbedded in a phosphatic matrix; in most of the samples examined the chert making up about 50 per cent. of the mass. The matrix is quite pure phosphate of lime, but the matrix and chert together contain only about 40 per cent., and are too intimately mixed to be separated by any process now commercially available. Therefore, although the indications are that there is a considerable amount of this rock, it is not at present of any commercial importance. The white-bedded phosphate is confined to a small area in Perry County, in the valleys of Red Bank and Terrapin Creeks. It is found interbedded with the Carboniferous chert, and is about 40 feet in thickness; it is probably, in origin, a secondary deposit, being a replacement of the calcite in the chert by lime phosphate, and so is not commercially available, but is of interest as pointing to the possibility of other deposits of higher grade in rocks not hitherto suspected of containing phosphates, namely, the wide-spread Carboniferous chert formations of Tennessee, Alabama, etc.

(5) The Silurian phosphate occurs in a number of places as a regular stratum in, or at the top of, the Trenton limestone. It reaches a thickness of four feet or more, but is ordinarily less than this, and contains from 25 per cent. to 45 per cent. bone phosphate.*

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*Safford's Report of Bureau of Agriculture of Tennessee, 1894, page 221.

It is almost exactly what the oolitic Devonian would be, if we suppose it to be diluted (so to speak), with 50 to 75 per cent. of limestone, as it shows many of the small coiled shells, and is of a lighter blue than the Devonian rock. Often it is separated from the Devonian by several feet of Niagara limestone, and again the latter is absent, and the Devonian lies immediately upon the lower Silurian rocks. At present this bed is of no commercial importance. *A somewhat similar occurrence has been noted in Kentucky.

The following sections (for three of which I am indebted to Mr C. W. Hayes, Sixteenth Annual Report of the Director of United States Geological Survey), will serve as aids to a clear understanding of the relations between the phosphate bed and the rocks accompanying it:

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*Geological Survey of Kentucky, N. S. Shaler, Director, 1878, New Series, Vol. IV.

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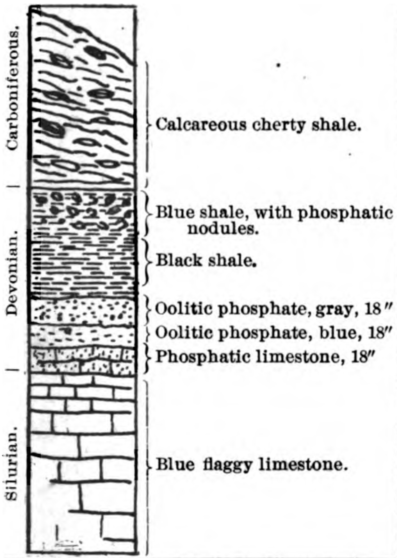
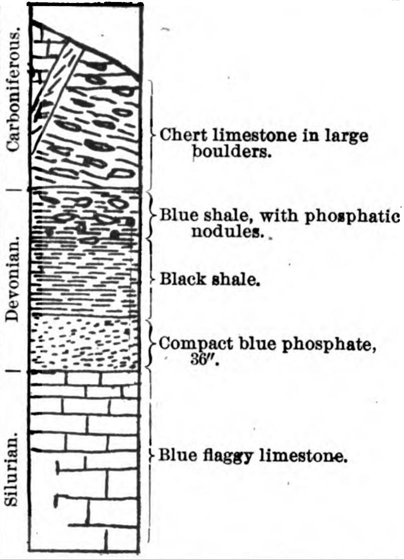
SECTIONS SHOWING THE RELATIONS OF THE TENNESSEE PHOSPHATE TO ADJACENT FORMATIONS.

SCALE: 1 inch—10 feet.

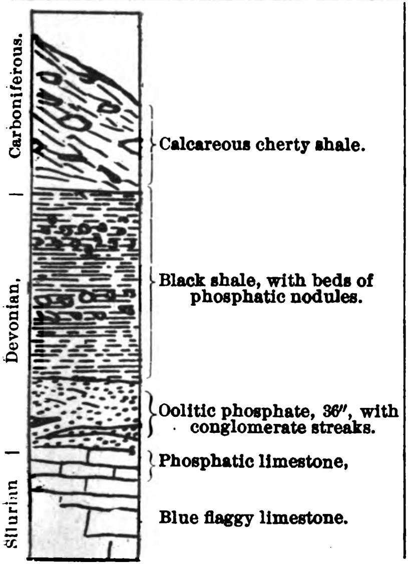
Totty's Bend, Hickman County.


Carboniferous.
Devonian.
Silurian.
Calcareous cherty shale.
Blue shale, with phosphatic nodules.
Black shale.
Oolitic phosphate, gray, 18″
Oolitic phosphate, blue, 18″
Phosphatic limestone, 18″
Blue flaggy limestone.

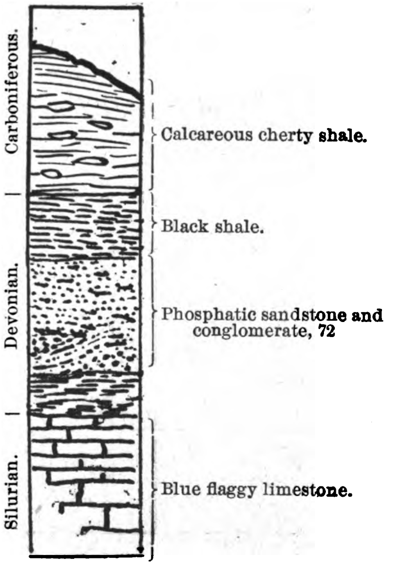
Booker's Blue Buck Creek, Hickman Co.


Carboniferous.
Devonian.
Silurian.
Chert limestone in large boulders.
Blue shale, with phosphatic nodules.
Black shale.
Compact blue phosphate, 36″.
Blue flaggy limestone.

Falls Branch, Hickman County.



Skull Creek, Hickman County.



The phosphate is mined both by open-cut work and by drifting. In the open-cut work, at present, often a very large amount of overburden is removed, and this has probably been done at a loss in many cases. No general estimate can be given applicable to all cases, because of the differences in the nature of this overburden, but probably a removal of more than twelve feet of overburden would be unprofitable. In mining under cover, drifting is always used, no shafts so far having been put down. The mining of the rock, when thus conducted, resembles closely the mining of the Clinton hematite ores of Alabama, except that the seam is thinner than the ore-bed usually is. Some form of "long-wall" mining will probably prove most satisfactory, and proper planning, equipment and working of the mine will, as certainly as with coal or iron ore, pay handsomely here. Since all the mines lie from two to eight miles from a railroad, the bulk of the rock shipped up to this time has been hauled to the cars in wagons. This has added much to the cost of the rock on board. As to the cost of the mining itself, a great deal depends upon the character of the roof. The most favorable roof is unaltered, compact black shale, and the worst one of weathered shale, or other earthy material.

Following is an approximate estimate of cost of putting rock on cars or wagons at the mines, for an average mine putting out 50 and 100 tons daily, and for open-cut operations on a 24-inch vein, with 10 feet of overburden. Exact estimates are as yet difficult to obtain, and these figures represent what has been and may be obtained by careful working, and are supposed to represent outside figures:

APPROXIMATE COST PER TON.

OUTPUT PER DIEM.	Labor, including dead work, etc.	Supplies, Mine Timber, etc.	Superintendence, clerks, interest, repairs, etc.	Breaking.	Total cost on board cars or wagons, at Mines.
40 to 50 tons..............	.92	.07	.40	.15	$1 54
80 to 100 tons............	.91	.06	.25	.15	1 37
50 to 60 tons—Stripping	.72	.05	.40	.15	1 32

The only preparation this rock requires for market is to be broken to a size of 3 inches, and in many cases even this is not necessary; therefore the figures given above would be reduced by 15 cents per ton.

Chemistry and Technology.—The chemistry of the Tennessee phosphate is practically the same as that of other rock-phosphate deposits of the world, except that it usually contains a larger per centage of pyrite (by-sulphid of iron) than do most others. By ordinary methods of analysis this appears as iron oxid, and its amount should, therefore, always be separately determined and distinctly stated. Concerning the action of pyrite in acid phosphate, Dr. H. W. Wiley, Chemist to United States Department of Agriculture says (Principles and Practice of Agricultural Analysis, Vol. II., page 153): "Pyrite and the silicates containing iron are not attacked by sulphuric acid, and these compounds are therefore left in the final product in a harmless state. If the pyritic iron is to be brought into solution, aqua regia should be employed." Experience and experiments with Tennessee rock lead to the same conclusion. It is possible that pyrite in Tennessee rock, especially that in a very finely-divided condition, may oxidize to some extent in the course of some time after the acid phosphate is made, but the writer believes that its effect will, since the phosphate is then quite dry, be almost inappreciable. Alumina is present in only small amounts; fluorin is a constant ingredient, and titanium is present in small quantities. Several analyses, made for commercial purposes, and therefore incomplete, but showing fully the character of the rock, follow:

ANALYSES OF REPRESENTATIVE MEDIUM AND HIGH GRADE ROCKS.

CONSTITUENTS.	Oolitic Gray Rock. (a)	Compact Gray Rock.	Compact Blue Rock.	Compact Blue Rock from another mine. (b)	Compact Blue Rock from a third mine.	"Kidneys."	Oolitic Blue Rock.
Phosphoric Acid...............	33.73	36.21	34.74	32.91	(c) 32.67	30 64	31.63
"Bone Phosphate" On dry basis..................	73.63	79.77	76.40	73.40	(c) 72.23	67.14	68.95
Iron Oxid........................	2.06	2.84	2.18	.86	(c)2.14	3.42	....
Alumina........................		.41	.14	1.92			....
Iron Sulphid (Pyrite)........	2.09	None.	4.08	4.05	(c) 4.52	.43	....
Carbonic Acid..................	3.54	....	....	2.72	1.84	.98	....
Equivalent to Lime Carbonate	8.01	....	....	6.18	4 20	.48	....
Moisture	.25	1.04	.72	....	1.40	....	....
Organic Matter................	1.13	....	....	....	....	....	....
Lime..............................	47.18	....	....	....	47.37	....	....
Magnesia........................	.23	....	....	....	....	....	....
Sand and Insoluble Matter.	2.88	....	....	....	2.22	....	....
Calcium Sulphate............	....	....	....	....	5.65	....	....

(a) By Lehmann & Glaser. (b) By C. G. Memninger. (c) Average fifteen samples drawn at different times from same mine. These analyses are from Tennessee Phosphate Company Swan Creek Phosphate Company, Southwestern Phosphate Company, Hickman Phosphate Company, and Duck River Phosphate, Company. Except as noted, all these were made by myself.

The Tennessee rock grinds well after mixing, and dries out quickly to an easily friable product, giving, when rightly handled, a product with a very high percentage of available phosphoric acid. Manufacturers are, to judge by the increasing demand, much pleased with it, and many express themselves as liking it better than any other phosphate rock they have tried.

As mentioned above, the only preparation necessary is to break to a 2 or 3-inch size, either by hand or machine. No drying is required, except when wet by rain or snow, and only one dryer has been put up in the field; this is very simple, and uses exhaust steam from the engine operating the crusher. Probably the best practice, especially with a rock below 70 per cent., is to pass the product from the crusher through a screen of about ½-inch mesh; this frees it, to a considerable degree, from clay or sand that may adhere to it, and the fine stuff may then be ground and sold to mixers or for direct application, as it usually contains over 60 per cent.

bone phosphate. Tipple screens, such as are used at coal mines, serve much the same purpose.

COMPANIES AND DEVELOPMENTS IN THE FIELD.

The Southwestern Phosphate Company's head office is in Nashville. Their developments consist of a large amount of stripping, and of a considerable amount of entry work, together with a mill building, on Falls Branch, containing a 60-horse power engine McCulley crusher and Sturtevant mill with screens; they have also put up houses for their men, commissary, etc. Their properties lie on Falls Branch and Swan Creek, in Hickman County, and the thickness of the seam worked varies.

The office of the Swan Creek Phosphate Company is at Centreville, and their properties lie on Haw Branch and Blue Buck Creek, together with several undeveloped properties on Upper Swan. Developments consist of mines at both places (now leased), two crushers and buildings, and about four miles of narrow-gauge track, extending from Swan Bluff Postoffice to the Centreville branch of the Nashville, Chattanooga & St. Louis Railroad, as well as houses, shops, etc. The Haw Branch mines of this company have been leased to Mr. H. I. Arnold (postoffice, Columbia, Tenn.), and their McCaleb mines, on Blue Buck, to the Blue Buck Mining Company (postoffice, Centreville, Tenn.) Developments at the first of these mines consist of a large amount of stripping and some entry work, and at the latter, of stripping and about 1,000 feet of entry work, several rooms and mine equipment, including tracks, cars, tipple and scales. Rock from this mine is wagoned to the end of the narrow-gauge road on Haw Branch.

The Duck River Phosphate Company's head office is in Nashville, and their mines in Totty's Bend of Duck River. Their developments are quite extensive, consisting of several hundred feet of entries, ten Rand drills, with air compressors, engines, etc., and mine equipment of tracks, cars, etc. Their mill, with Gates' crusher, drying room and incline hoist, is located at Centreville. Water transportation, on Duck River, is used to get the rock from mines to crusher. For this purpose a steam tow-boat and fleet of barges is used, but as these can only be run at certain stages of water, a broad-gauge track is being built from Centreville to the mouth of Swan Creek, a distance of three miles, to connect at this point with the boats, since the navigation thence to the mines is fairly good. Besides these there are houses, shops, etc.

The Tennessee Phosphate Company's properties lie on Swan Creek, two miles above Sunrise Postoffice, and at the Mayfield farm, five or six miles above this, in Lewis County. At the former place (Nunn Mines), developments consist of a large amount of stripping, with several hundred feet of entry work, mine equipment, scales, tipple, and four and one-half miles of narrow-gauge railroad to Ætna Furnace, on the Nashville, Chattanooga & St. Louis Railroad. Besides these are comfortable houses for the men and officials, commissary, etc. Nothing except prospect work has been done on their Mayfield place. This company went into the hands of a receiver during September last, and no mining is now being done.

The Hickman Phosphate Company's office is at Centreville, and their mines on Persimmon Branch, on the west side of Swan Creek. Developments consist of stripping and a small amount of entry work, with houses for the men.

The Standard Phosphate Company's office is at Centreville, and their mines on Persimmon Branch and Short Branch, in Hickman County. They have been running only a short time.

The Lewis County Phosphate Company's office is at Ætna, Tenn., and their mines adjoin the Mayfield property of the Tennessee Phosphate Company. Developments consist only of stripping, and they are not now running.

Although much retarded by lack of transportation facilities (the mines all lying from two to eight miles from the railroad), the growth of the phosphate industry in Tennessee has been steady and rapid. In 1894, 17,384 long tons were shipped from the field, and in 1895, 49,635 tons. Low prices during the winter and spring of 1894 and 1895 tended to restrict the output, but during the summer and fall prices improved very materially, and existing conditions seem to favor a rapid development, provided transportation, which is still bothering some of the miners, can be arranged for. Manufacturers of fertilizers in the North and Northwest are using more phosphate rock now than ever before, and seem, as a rule, disposed to increase their consumption. One or two trial shipments have been made abroad, and the rock has been well received by the manufacturers, but it still remains a problem as to whether it can be sent to Europe at a profit. Should this be attempted, Norfolk, Va., will be the port of shipment. Should the European market improve, it is probable that high grade rock can be exported.

COAL PRODUCTION OF TENNESSEE.

The records of coal production in Tennessee date from 1873, but for the years from that date the amounts reported were principally estimates, except for 1880, when the tenth United States census showed a total product of 641,042 short tons. The estimated output in 1873 was 3,500,000 tons. From then until 1891 there was a practically steady increase in the annual production, reaching in the latter year 2,413,678 short tons, the largest output in any one year in the history of coal mining in the State. Except for the census years 1880 and 1889, the only reliable statistics of production in Tennessee have been compiled by the geological survey and published in Mineral Resources of the United States; the years for which they were thus obtained are from 1885 to 1894 (except the census year of 1889), and appear in a subsequent table.

In 1892 the coal mining interests of the State suffered severely from the riots brought on by the opposition of free labor to the employment of convicts in competition with it. In that year the production was 321,614 short tons, or more than 15 per cent. less than in 1891.

Owing to the action of the State authorities, these demonstrations were less marked in 1893, but the industry felt the effects of the industrial and financial depression, and a further decrease of 189,806 short tous, or nearly 10 per cent. was noted.

The strike of 1894 affected some of the mines in this State, but not so general as in others, and the product increased 278,621 tons over that of 1893.

The value increased only $71,032, about 6½ per cent., the average price in sympathy with the general decline in values falling from $1.08 per ton to 97 cents.

In the accompanying tables the statistics of production during 1893 and 1894 are given by counties.

The annual output of coal in Tennessee since 1873 has been as follows:

1873	350,000	1885	1,440,957
1874	350,000	1886	1,714,290
1875	360,000	1887	1,900,000
1876	550,000	1888	1,967,297
1877	450,000	1889	1,925,689
1878	375,000	1890	2,169,585
1879	450,000	1891	2,413,678
1880	641,042	1892	2,092,064
1881	750,000	1893	1,902,258
1882	850,000	1894	2,180,879
1883	1,000,000	1895	2,319,720
1884	1,200,000		

COAL PRODUCT IN 1893, BY COUNTIES.

COUNTIES.	Loaded at mines for shipment—Short tons.	Sold to local trade and used by employes—Short tons.	Used at mines for steam and heat—Short tons.	Made into coke—Short tons.	Total amount produced—Short tons.	Total value.	Average price per ton.	Average No. of days active.	Total No. of employes.
Anderson	306,177	1,750	3,850	....	311,777	$ 319,115	$ 1 02	247	665
Bledsoe	....	....	....	....	....	....	....	....	....
Campbell	251,796	7,231	1,476	2,000	262,503	328,897	1 25	175	936
Claiborne	154,754	500	800	25,476	181,530	163,447	90	142	280
Franklin	600	600	....	....	1,200	2,400	2 00	100	6
Grundy	132,912	1,019	2,302	157,780	294,013	305,774	1 04	247	548
Hamilton	112,750	1,552	1,848	39,373	155,523	158,681	1 02	260	670
Marion	140,572	1,254	633	69,135	211,594	206,452	98	262	480
Morgan	77,565	384	241	....	78,190	83,542	1 07	224	272
Rhea	1,790	9,353	1,344	84,044	96,531	86,151	89	295	245
Roane	5,405	3,842	4,557	25,750	39,554	57,891	1 46	203	160
Scott	138,395	9,395	2,190	8,000	157,980	220,800	1 40	222	414
White	104,503	1,680	1,680	....	107,863	111,299	1 03	307	300
Small mines	....	4,000	....	....	4,000	4,000	....	....	....
Total	1,427,219	42,560	20,921	411,558	1,902,258	$2,048,449	$ 1 08	232	4,976

COAL PRODUCT IN 1894, BY COUNTIES.

COUNTIES.	No. of mines.	Loaded at mines for shipment—Short tons.	Sold to local trade and used by employes—Short tons.	Used at mines for steam and heat—Short tons.	Made into coke—Short tons.	Total produced—Short tons.	Total value.	Average price per ton.	No. of days active.	Average No. of employes.
Anderson	7	535,108	3,014	4,600	1,500	544,222	$ 527,671	$ 0 97	256	1,217
Campbell	8	169,448	4,105	1,340	8,395	183,288	192,757	1 05	140	698
Claiborne	4	142,145	550	....	24,458	167,153	157,377	94	169	277
Franklin Grundy Putnam White,	4	327,716	2,931	8,800	144,355	483,802	415,629	86	224	1,229
Hamilton	3	100,398	1,193	1,009	53,701	156,301	141,008	90	218	441
Marion	3	110,945	11,143	434	62,075	184,597	209,627	1 14	183	522
Morgan	6	63,451	800	350	....	64,601	63,233	98	145	373
Rhea	3	4,386	7,751	3,360	108,618	124,115	125,823	1 01	253	209
Roane	2	3,456	11,238	2,800	101,393	118,887	118,887	1 00	307	210
Scott	3	114,353	12,760	6,300	16,000	149,413	162,969	1 09	194	366
Small mines	...	....	4,500	....	....	4,500	4,500	....	.....	....
Total	43	1,571,406	59,985	28,993	520,495	2,180,879	$2,119,481	$ 97	210	5,542

In the following table is shown the total production, by counties, since 1889, with the increase and decrease in each county during 1894, as compared with the preceding year:

INCREASE AND DECREASE.

COUNTIES.	1889. Short tons.	1890. Short tons.	1891. Short tons.	1892. Short tons.	1893. Short tons.	1894. Short tons.	Increase in 1894. Short tons.	Decrease in 1894. Short tons.
Anderson	457,069	582,403	587,558	409,970	311,777	544,222	232,445	....
Campbell	123,103	126,367	159,937	289,605	262,503	183,288	....	79,215
Claiborne	*a*	*a*	73,738	137,219	181,530	167,153	....	14,377
Franklin	*b*	1,500	1,400	1,400	1,200	3,000	1,800	....
Grundy	400,107	349,467	398,936	358,023	294,013	365,989	71,976	....
Hamilton	241,067	277,896	243,298	105,283	155,523	156,301	778	....
Marion	203,923	213,202	271,809	241,974	211,594	184,597	....	26,997
Morgan	68,229	143,518	125,287	34,970	78,190	64,601	....	13,589
Putnam	....	....	....	....	....	659	659	....
Rhea	149,194	211,465	213,649	133,424	96,531	124,115	27,584	....
Roane	*c* 174,551	70,452	112,308	102,588	39,554	118,887	79,333	....
Scott	108,027	136,365	142,943	183,230	157,980	149,413	....	8,567
White	*b*	52,650	78,315	90,378	107,863	114,154	6,291	....
Other counties & small mines	419	4,300	4,500	4,000	4,000	4,500	500	....
Total	1,925,689	2,169,585	2,413,678	2,092,064	1,902,258	2,180,879	*e* 278,621	....
Net increase	....	243,896	244,093	*d* 321,614	*d* 189,806	....	....	....

a Developing. *b* Included in Roane County. *c* Includes Franklin and White Counties. *d* Net decrease. *e* Net increase.

COAL PRODUCTION IN 1895 BY COUNTIES, WITH INCREASE AND DECREASE OVER PREVIOUS YEAR.

COUNTY.	Total Production—Short tons.	Increase in 1895—Short tons.	Decrease. in 1895—Short tons.
Anderson	345,391	…………	198,831
Claiborne	147,122	…………	20,031
Campbell	324,289	141,001	…………
Grundy	446,386	80,397	…………
Hamilton	166,889	10,588	…………
Marion	302,298	117,701	…………
Morgan	61,665	…………	2,936
Putnam	7,726	7,067	…………
Roane	129,423	10,536	…………
Rhea	140,852	16,737	…………
Scott	112,178	…………	37,235
White	123,334	9,180	…………
Other counties & small mines	12,167	4,667	…………
Total	2,319,720	397,874	259,033

Blanks were sent to every operator in the State, requesting necessary data to compile statistics of value of product, average cost of production, number of days in operation, etc. A few of the operators complied with the request, but insufficient to base the cost of product, etc., the laws of Tennessee not compelling them to answer such questions from this Bureau.

In connection with the foregoing table the following statements of the average prices ruling in the important producing counties, and the statistics of labor and working time for the same period should be considered:

AVERAGE PRICES.

COUNTIES	1889	1890	1891	1892	1893	1894
Anderson	$1 16	$1 17	$1 15	$1 11	$1 02	$0 97
Campbell	1 15	1 22	1 27	1 19	1 25	1 05
Claiborne	....	....	1 19	1 04	90	94
Grundy	99	94	89	1 11	1 04	80
Hamilton	1 30	1 15	1 12	1 11	1 02	90
Marion	1 13	1 06	1 11	1 08	98	1 14
Morgan	1 34	1 10	1 09	1 36	1 07	98
Rhea	1 10	1 00	1 00	1 00	89	1 01
Roane	....	....	1 15	1 05	1 46	1 00
Scott	1 34	1 29	1 25	1 24	1 40	1 09
White	....	....	1 31	1 25	1 03	1 03
The State	$1 21	$1 10	$1 10½	$1 13	$1 08	$0 97

STATISTICS OF LABOR EMPLOYED.

COUNTY.	1890.		1891.		1892.		1893.		1894.	
	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average working days.	Average number employed.	Average workrng days.
Anderson	1,325	291	1,350	242	1,072	218	665	247	1,217	256
Campbell	251	212	451	145	732	213	936	175	698	140
Claiborne	....	....	165	172	276	207	280	142	277	169
Grundy	880	310	515	311	800	309	548	247	904	238
Hamilton	500	285	475	213	365	192	670	260	441	218
Marion	523	226	615	220	375	286	480	262	522	183
Morgan	363	258	363	250	156	148	272	224	373	145
Rhea	450	200	350	250	175	307	245	295	209	253
Roane	....	....	210	277	207	282	160	203	210	307
Scott	475	241	347	182	448	243	414	222	366	194
White	....	....	246	228	300	232	300	307	300	196
The State	5,082	263	5,097	230	4,926	240	4,976	232	5,542	210

TENNESSEE COAL MINES.—*Name of Mine, Operators, Superintendents, Location, Etc.*

NAME OF MINE.	NAME OF OPERATOR.	NAME OF SUPERINTENDENT.	COUNTY.	POSTOFFICE.	MAP OF MINES ON FILE.
Bon Air	Bon Air Coal & Coke Company	J. L. Dibrell	White	Bon Air	No.
Sewanee	Tennessee Coal, Iron & R. R. Co.	E. O. Nathurst	Grundy	Tracy City	Yes.
Ramsey	Tennessee Coal, Iron & R. R. Co.	E. O. Nathurst	Grundy	Tracy City	Yes.
Thomas	Tennessee Coal, Iron & R. R. Co.	G. H. Crozier	Marion	Whitwell	No.
Monterey	Monterey Coal Co	R. J. Moscrip	Putnam	Monterey	Yes.
Battle Creek	Battle Creek Coal Co	J. R. Wynn	Marion	South Pittsburg	No.
Dunlap	(Not in operation.)		Sequatchie		
Pikeville	(Not in operation,)		Bledsoe		
Little Mountain	(Not in operation.)		Franklin	Sewanee	
Ætna	Ætna Coal Co	D. B. Pillsbury	Marion	Whitesides	Yes.
Daisy	New Daisy Coal & Coke Co	M. L. Jenkins	Hamilton	Daisy	No.
Soddy	New Soddy Coal Co	C. B. Finley	Hamilton	Soddy	Yes.
Sale Creek	Sale Creek Coal & Coke Co	David Griffiths	Hamilton	Sale Creek	Yes.
Graysville	Fox Coal & Coke Co	T. A. Line	Rhea	Graysville.	Yes.
Nelson	Dayton Coal & Iron Co., Limited	W. K. Gibson.	Rhea	Dayton	Yes.
Dixon Slope	Dayton Coal & Iron Co., Limited	W. K. Gibson	Rhea	Dayton	Yes.
New Richland	Wm. McNelis (Lessee)	Wm. McNelis	Rhea	Dayton	Yes.
Rockwood	Roane Iron Co.	Willard Warner, Jr	Roane	Rockwood	Yes.
Drift Slope	Roane Iron Co.	Willard Warner, Jr	Roane	Rockwood	Yes.
Nelson	Roane Iron Co.	Willard Warner, Jr	Roane	Rockwood	Yes.
Oakdale	Oakdale Coal & Coke Co		Morgan	Oakdale	No.
Glen Mary	Glen Mary Coal & Coke Co	A. J. Totten	Scott	Glen Mary	Yes.
Lehigh	Ridgeway, Sprankle & Co	W. M. Sprankle	Scott	Helenwood	No.
Robbins	Tennessee Paving Brick Co	J. S. Key	Scott	Robbins	No.
Paint Rock	Paint Rock Coal & Coke Co	John M. W. Brown	Scott	Almy	No.
State Mines	State of Tennessee	J. T. Hill	Morgan	Joynersville	Yes.
Oliver	Oliver Coal Co.	Joseph Richards	Morgan	Oliver Springs	Yes.
Poplar Creek	Queener Brothers	A. J. Queener	Morgan	Oliver Springs	Yes.
Winter's Gap	Winter's Gap Coal Co	E. J. Philips	Morgan	Oliver Springs	Yes.
Indian Creek	Indian Creek Coal Co.	R. A. McFerrin	Morgan	Oliver Springs	Yes.
Big Mountain	Mine is abandoned		Morgan	Oliver Springs	Old Map.

TENNESSEE COAL MINES—*Continued.*

NAME OF MINE.	NAME OF OPERATOR.	NAME OF SUPERINTENDENT.	COUNTY.	POSTOFFICE.	MAP OF MINES ON FILE.
Eagle Coal Co	Jos. Shelden & Sons	Jos. Shelden	Morgan	Oliver Springs	Yes.
Black Diamond	Black Diamond Coal Co	J. M. Andrews	Anderson	Coal Creek	Yes.
Beech Grove	Black Diamond Coal Co	J. M. Andrews	Anderson	Coal Creek	Yes.
Shamrock	Black Diamond Coal Co	J. M. Andrews	Anderson	Coal Creek	
Central	Black Diamond Coal Co	J. T. Evans, Contractor	Anderson	Coal Creek	No.
Knoxville Iron Co	Knoxville Iron Co	W. L. Nelson	Anderson	Coal Creek	Yes.
Cross Mountain, No. 1	Knoxville Iron Co	W. L. Nelson	Anderson	Coal Creek	Yes.
Cross Mountain, No. 2	Knoxville Iron Co	W. L. Nelson	Anderson	Coal Creek	Yes.
Fraterville	Coal Creek Coal Co	A. H. Bowling	Anderson	Coal Creek	Yes.
Thistle	Coal Creek Coal Co	A. H. Bowling	Anderson	Coal Creek	Yes.
Keystone	Tennessee Coal Co	H. B. Bowling	Anderson	Coal Creek	Yes.
Peacock	Bowling Brothers		Anderson	Coal Creek	No.
Royal	Royal Coal & Coke Co	John D. Heck	Campbell	Coal Creek	Yes.
Cambria	Royal Coal & Coke Co	J. E. Hightower (Lessee.)	Campbell	Coal Creek	Yes.
Pioneer	Buckeye Coke Co	Geo. L. Washburn	Campbell	Pioneer	Yes.
Elk Valley	Elk Valley Coal Co	W. T. Love	Campbell	Elk Valley	No.
Pine Mountain	Pine Mountain Coal Co	J. J. Rodeheaver.	Campbell	Newcomb	No.
Standard	Standard Coal & Coke Co	Jno. C. Brooks	Campbell	Newcomb	Yes.
Wooldridge	Wooldridge Jellico Coal Co	J. R. Wooldridge	Campbell	Newcomb	Yes.
Falls Branch	Falls Branch Jellico Coal Co	A. W. Schenck	Campbell	Newcomb	Yes.
Indian Mountain.	Indian Mountain Coal Co	Chas. Livingston	Campbell	Jellico	No.
Italian, Blue Gem	Italian Blue Gem Coal Co	Thomas Zechini	Campbell	Jellico	No.
Blue Gem	Blue Gem Coal Co	Harry Wynn	Campbell	Jellico	No.
Blue Gem	W. H. Provins	W. H. Provins	Campbell	Jellico	
East Jellico	East Jellico Coal Co	A. W. Smith	Campbell	Newcomb	No.
Mingo, No. 1	Mingo Coal & Coke Co	R. L. Ralston	Claiborne	Middlesboro, Ky.	Yes.
Mingo, No. 2	Mingo Coal & Coke Co	R. L. Ralston	Claiborne	Middlesboro, Ky.	Yes.
Fork Ridge	Fork Ridge Coal & Coke Co	Thomas Pruden	Claiborne	Hartranft	Yes.
Bryson Mountain	Bryson Mountain Coal & Coke Co	J. W. Cockill	Claiborne	Hartranft	Yes.
Reliance	Reliance Coal & Coke Co	Philip C. Swab	Claiborne	Hartranft	Yes.

TENNESSEE IRON MINES—(*That reports have been received from*).

NAME OF MINE.	NAME OF OPERATOR.	NAME OF SUPERINTENDENT.	COUNTY.	POST-OFFICE.	MAP OF MINES ON FILE.	
Pyott Slope	Brown Mining Co	J. N. Baker	Roane	Cardiff	Yes	See Report.
Warner Slope	Brown Mining Co	J. N. Baker	Roane	Cardiff	Yes	See Report.
Cardiff Slope	Brown Mining Co	J. N. Baker	Roane	Cardiff	Yes	See Report.
Baker Slope	Brown Mining Co	J. N. Baker	Roane	Cardiff	Yes	See Report.
Slope No. 1	Brown Mining Co	J. N. Baker	Roane	Cardiff	Yes	See Report.
Slope No. 2	Brown Mining Co	J. N. Baker	Roane	Cardiff	Yes	See Report.
Watts Mine No. 1	Watts Steel & Iron Syndicate (Lim.)	J. A. Jardine	Claiborne	Cumberland Gap	Yes	See Report.
Watts Mine No. 2	Watts Steel & Iron Syndicate (Lim.)	J. A. Jardine	Claiborne	Cumberland Gap	Yes	See Report.
Chilhowee	Watts Steel & Iron Syndicate (Lim.)	R. T. Vann.	McMinn.	Cambria	No	No underground work.
Eureka	Roberts, Sparks & Co	Al. Roberts	Roane	Welckers	No	But two entries working underground Most of work is earth stripping.
Inman	Tenn. Coal, Iron & R. R. Co	R. A. Patton, Contractor.	Marion	Inman	No	No underground work in operation.
Johnson	Buffalo Iron Co	R. Ewing, President, Nashville, Tenn.	Hickman		...	These are ore *banks.
Mannie	Buffalo Iron Co		Wayne		...	No mining is necessary.
Old Cumberland	Buffalo Iron Co		Dickson		...	(No report received.)

*There are several other banks, scattered throughout East and Middle Tennessee, that no report have been received from. (See report of the Pittsburg Sulphur, Copper & Iron Co., Ducktown.)

COPPER, LEAD AND ZINC MINES.

NAME OF MINE.	NAME OF OPERATOR.	NAME OF SUPERINTENDENT.	COUNTY.	POST-OFFICE.	MAP OF MINES ON FILE.	
Mary Copper Mine	Ducktown Sulphur, Cop. & Iron Co.	Thos. Carter	Polk	Isabella	Yes	No Report.
Isabella Copper Mine	Ducktown Sulphur, Cop. & Iron Co.	Thos. Carter	Polk	Isabella	No	
Polk County (Copper)	Pittsburg & Tenn. Copper Co	D. J. Nelson	Polk	Ducktown	Yes	
Hardwick Lead Mines	Hardwick Lead Co	C. L. Hardwick	Bradley	Cleveland	No	No Report.
Blue Springs Lead Mines	Blue Springs Mining Co	Samuel Divine, Pres't. Chattanooga.	Adjoins above mine.		No	No Report. Not in operation.

ZINC MINES.—None reported in operation during past year. Some work has been done at Mossy Creek, penning up mines.

STATISTICS OF TENNESSEE COAL MINES.

NAME OF COMPANY OR CORPORATION.	COUNTY.	OUTPUT IN SHORT TONS FOR THE YEAR 1895.												TOTAL OUTPUT. (SHORT TONS.)
		JAN.	FEB.	MAR.	APR.	MAY.	JUN.	JULY.	AUG.	SEP.	OCT.	NOV.	DEC.	
Bon Air Coal & Coke Co.	White*	....	....	....	....	....	....	....	....	....	....	....	....	123,334
Tennessee Coal, Iron & R. R. Co.	Grundy	....	....	....	....	....	....	....	....	....	....	....	....	446,386
Tennessee Coal, Iron & R. R. Co. (Ramsey)	Grundy													
Tennessee Coal, Iron & R. R. Co.	Marion	18,951	17,961	19,041	17,487	16,308	17,445	20,132	22,876	21,334	23,633	23,130	20,948	239,246
Monterey Coal Co.	Putnam	384	594	454	462	564	630	186	638	610	1,220	1,034	950	7,726
Butler Creek Coal Co.	Marion	300	400	600	800	700	800	1,000	1,000	800	900	700	700	8,700
Dunwoody & Co.	Marion	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunlap	Sequatchie	....	....	....	....	....	....	....	....	....	....	....	....	....
Pikeville	Bledsoe	....	....	....	....	....	....	....	....	....	....	....	....	....
Brooks & Co.	Franklin	....	....	....	....	....	....	....	....	....	....	....	....	....
Etna Coal Co.	Marion	3,844	3,646	3,150	3,017	2,426	3,950	5,459	6,424	5,258	5,964	6,683	4,531	54,352
New Daisy Coal Co.	Hamilton*	....	....	....	....	....	....	....	....	....	....	....	....	3,016
New Soddy Coal Co.	Hamilton	14,301	12,172	13,647	13,312	10,387	11,306	13,604	3,399	5,767	11,036	13,234	12,342	134,507
Sale Creek Coal & Coke Co.	Hamilton	3,153	3,521	907	2,385	786	422	2,000	1,934	2,612	2,579	4,937	4,130	29,366
Fox Coal & Coke Co.	Rhea	385	328	709	306	207	108	501	585	841	588	789	700	6,047
Dayton Coal & Iron Co., Limited, (Richland)	Rhea	1,110	1,779	1,639	2,382	3,012	2,448	2,551	2,768	4,440	5,825	8,151	6,050	42,155
Dayton Coal & Iron Co., Limited, (Nelson)	Rhea	8,337	6,128	8,580	7,840	8,832	8,270	8,114	8,906	7,406	7,763	7,564	4,910	92,650
Dayton Coal & Iron Co., Limited, (Dixon Slope)	Rhea													
Roane Iron Co.	Roane	12,105	8,931	7,007	11,031	11,072	10,293	10,840	11,356	10,237	11,547	11,293	13,711	129,423
Roane Iron Co.	Roane													
Glen Mary Coal & Coke Co.	Scott	4,326	4,686	2,954	2,849	1,271	1,657	3,068	3,439	3,823	5,385	5,262	4,532	43,252
Tennessee Paving Brick Co	Scott	1,034	876	991	884	937	473	581	910	645	661	444	135	8,571
Paint Rock Coal & Coke Co.	Scott	6,239	7,194	5,283	4,553	....	....	3;136	6,804	5,209	9,443	7,404	5,090	60,355
State of Tennessee	Morgan	119	125	100	270	640	769	1,368	2,550	2,471	4,228	5,675	7,382	25,697
Oliver Coal Co	Morgan	285	465	........†	........†	........†	........†	........†	........†	........†	1,510	2,200	2,550	7,010
Queener Brothers	Morgan	1,612	1,437	892	613	319	150	295	1,041	2,050	2,138	1,311	2,131	13,989
Winter's Gap Coal Co.	Morgan	431	755	305	125	20	65	230	565	450	823	1,062	1,116	5,947
Indian Creek Coal Co.	Morgan	380	1,295	605	135	295	151	75	345	485	910	837	676	6,189
Eagle Coal Co.	Morgan	....	....	....	....	....	....	....	205	655	715	668	590	2,833
Black Diamond Coal Co	Anderson	10,638	12,219	5,594	9,046	6,906	6,279	5,964	3,964	7,887	10,690	10,832	9,294	99,313
Black Diamond Coal Co., (Beech Grove)	Anderson													
Black Diamond Coal Co., (Shamrock)	Anderson													
Black Diamond Coal Co., (Central)	Anderson													
Knoxville Iron Co., (Coal Creek)	Anderson	4,608	4,300	4,885	5,425	5,195	4,465	5,185	5,578	5,625	6,805	6,365	5,885	64,321
Knoxville Iron Co., (Cross Mountain)	Anderson	1,622	1,946	1,115	290	952	138	....	293	704	2,070	3,915	5,010	18,055
Coal Creek Coal Co., (Fraterville)	Anderson	9,299	7,449	5,176	6,084	6,688	4,638	7,763	6,565	4,653	6,963	6,231	6,272	77,773
Coal Creek Coal Co., (Thistle)	Anderson	3,821	4,232	3,914	2,901	2,767	2,260	2,406	3,567	1,966	2,182	3,246	3,245	36,507
Tennessee Coal Co.	Anderson*	....	....	....	....	....	....	....	....	....	....	....	....	49,422
Peacock Coal Co.	Anderson	....	....	....	....	....	....	....	....	....	....	....	....	....

Royal Coal & Coke Co.	Campbell	8,774	2,527	8,119	4,792	....	....	3,833	7,855	7,673	6,149	6,113	6,798	62,633
Royal Coal & Coke Co., (Cambria)	Campbell													
Buckeye Coke Co.	Campbell	....	....	....	....	4,600	4,600	4,800	4,300	3,250	3,900	3,800	2,965	82,215
Pine Mountain Coal Co.	Campbell	650	640	460	75	45	275	450	550	800	1,275	950	975	7,145
Standard Coal & Coke Co.	Campbell	6,925	7,962	3,324	2,733	1,623	1,167	3,491	5,670	6,427	9,528	8,908	7,929	65,687
Wooldridge Jellico Coal Co.	Campbell	7,925	9,355	4,436	3,283	558	1,156	4,193	7,841	8,191	12,718	12,129	10,252	82,037
Falls Branch Jellico Coal Co.	Campbell	5,861	5,371	3,429	1,159	637	1,509	2,792	4,106	5,331	8,400	8,844	7,025	55,464
Indian Mountain Coal Co.	Campbell	....	....	....	....	....	....	208	1,527	2,496	1,990	3,255	1,821	11,297
Italian Blue Gem Coal Co.	Campbell	....	....	....	....	....	....	....	....	....	....	....	....	....
Blue Gem Jellico Coal Co.	Campbell	....	....	....	198	361	340	381	1,097	1,400	1,619	1,132	1,283	7,811
Blue Gem, (W. H. Provins)	Campbell	....	....	....	....	....	....	....	....	....	....	....	....	....
East Jellico Coal Co.	Campbell	....	....	....	....	....	....	....	....	....	....	....	....	....
Mingo Coal & Coke Co.	Claiborne	....	....	....	....	....	....	....	....	....	....	....	....	76,236
Mingo Coal & Coke Co., No. 2	Claiborne													
Fork Ridge Coal & Coke Co.	Claiborne	856	1,284	1,032	652	332	378	800	1,000	1,000	1,500	1,600	1,200	11,634
Bryson Mountain	Claiborne	1,800	1,515	864	1,450	2,546	2,575	1,962	1,595	2,445	2,866	2,950	2,261	24,829
Reliance Coal & Coke Co.	Claiborne	3,638	4,231	2,502	2,854	2,383	2,290	1,987	2,269	3,550	2,906	2,850	2,963	84,423
Total	....	....	....	....	....	....	....	....	....	....	....	....	....	$ 2,307,553
Estimated output of mines not reported	....	....	....	....	....	....	....	....	....	....	....	....	....	12,167
Grand total	....	....	....	....	....	....	....	....	....	....	....	....	....	$ 2,319,720

*Not reported by the month. †Mine was idle.

CLASSIFICATION OF EMPLOYES IN TENNESSEE MINES, 1895.

NAME OF COMPANY OR OPERATOR.	NUMBER OF EMPLOYES INSIDE.											NUMBER OF EMPLOYES OUTSIDE.												Grand Total Number of Employes.
	Miners.	Miners' laborers.	Drivers.	Trip riders.	Company men Inside.	Timber men.	Track men.	Furnace men.	Trappers.	Other Employes.	Total men Inside.	Foremen.	Blacksmiths.	Carpenters.	Engineers.	Firemen.	Office men.	Store men.	Timber men.	Tip men.	Company men Outside.	Machinists.	Total men Outside.	
Bon Air Coal and Coke Company	120	31	16	...	......	...	2	...	6	94	269	...	4	2	5	4	4	8	...	...	20	...	42	311
Tennessee Coal and Iron Company (Sewanee), includes all mines operated in Grundy County	235	113	47	4	2	...	15	4	8	......	428	4	5	8	9	2	7	7	9	17	20	7	90	518
Monterey Coal Company	25	......	1	...	2	..	1	...	...	......	29	...	1	...	1	...	...	...	...	2	1	...	5	34
Battle Creek Coal Company	......	......	...	...	......	...	...	...	...	......	25	...	...	...	...	...	1	1	...	...	5	...	7	32
Tennessee Coal, Iron & Railroad Co. (Whitwell)	200	41	31	2	17	9	10	8	18	......	336	2	4	6	...	...	2	5	8	17	6	...	50	386
Ætna Coal Company	115	11	18	1	6	...	2	1	3	......	155	1	2	3	4	1	1	3	...	20	51	...	86	241
New Soddy Coal Company	203	60	23	1	6	3	2	2	19	......	319	1	2	1	3	3	2	8	4	6	4	...	34	353
Sale Creek Coal and Coke Company	53	15	6	1	4	1	3	...	4	......	87	1	1	3	2	1	1	3	2	4	7	...	25	112
Fox Coal and Coke Company	32	8	2	...	1	...	...	...	1	......	44	...	1	...	...	...	1	1	..	2	6	...	11	55
Dayton Coal & Iron Co., Limited (Richland)	80	12	10	...	......	...	2	1	4	......	109	1	1	1	...	...	...	...	3	6	......	...	12	121
Dayton Coal & Iron Co., Limited (Nelson)	72	14	22	3	4	...	7	3	6	......	131	...	2	1	1	2	2	...	...	5	7	...	20	151
Dayton Coal and Iron Co., Limited (Dixon Slope)	......	......	...	...	......	...	...	..	...	......	......	...	...	...	2	2	...	...	..	...	......	...	4	4
Roane Iron Company	100	20	17	4	4	5	7	...	4	59	220	...	3	2	7	5	2	...	5	11	......	...	35	255
Daisy Coal Company	15	......	...	...	......	...	...	...	...	......	15	...	...	...	...	...	...	...	...	...	......	...	......	15
Glen Mary Coal and Coke Company	39	5	6	2	......	1	2	1	3	43	102	2	3	5	3	1	2	3	3	11	7	...	40	142
Paint Rock Coal and Coke Company	120	......	16	2	......	...	2	1	6	2	149	2	1	1	2	3	2	2	5	7	2	...	27	176
State of Tennessee Mines (convicts)	168	......	9	...	......	3	7	1	5	31	224	2	5	76	...	...	4	...	8	10	13	...	118	342
Oliver Coal Company	54	10	6	...	3	...	...	...	2	3	78	..	...	...	...	...	...	...	...	...	......	...	......	78
Queener Bros	48	......	6	...	......	...	...	...	1	......	......	...	...	...	...	...	1	1	...	1	2	...	5	58
Winter's Gap Coal Company	18	3	...	..	1	...	...	1	1	......	23	...	...	...	...	..	1	...	...	2	......	...	3	26
Indian Creek Coal Company	25	7	2	...	......	...	1	...	...	......	35	...	1	...	...	...	...	...	3	1	1	...	6	41
Black Diamond Coal Co. (Beech Grove) Black Diamond Coal Co. (Shamrock) Black Diamond Coal Co. (Central)	169	......	20	...	8	6	2	2	8	......	215	..	2	2	2	1	3	5	...	9	......	...	24	239

Eagle Coal Company	16	4	2	...	......	...	...	...	...	......	22	...	...	...	...	...	...	...	...	...	......	...	......	22
Tennessee Paving Brick Company	25	......	...	...	......	...	...	...	...	......	25	...	...	...	...	...	...	...	...	...	......	...	......	25
Royal Coal and Coke Company	125	......	9	6	12	...	2	...	4	......	158	1	1	1	1	2	2	2	...	3	......	...	18	171
Royal Coal and Coke Company (Cambria)	50	15	3	1	1	...	1	1	1	5	78	1	1	...	1	1	...	1	...	2	5	...	12	90
Buckeye Coke Company	80	......	5	1	3	1	2	1	2	......	95	1	1	1	1	1	1	2	...	2	...	...	10	105
Pine Mountain Coal Company	25	......	4	...	2	...	...	...	...	......	31	...	1	...	...	...	...	2	...	2	......	...	5	36
Standard Coal and Coke Company	140	......	..	11	27	...	5	1	5	......	189	1	2	...	1	1	1	2	3	11	......	...	22	211
Wooldridge Jellico Coal Company	175	......	18	...	17	...	8	1	1	......	220	1	2	2	2	1	2	3	...	6	4	...	23	243
Falls Branch Jellico Coal Company	60	......	8	...	......	...	2	...	...	......	......	...	1	2	1	1	2	2	6	5	2	...	22	92
Indian Mountain Coal Company	80	......	3	...	1	1	1	1	2	......	88	1	1	...	...	...	1	1	...	5	1	...	11	99
Blue Gem Jellico Coal Company	40	12	3	1	2	1	...	...	...	......	59	1	1	...	...	...	1	1	2	3	......	...	9	68
Mingo Coal and Coke Company (No. 1)	41	......	4	...	......	...	1	1	...	....	47	...	1	2	1	1	1	2	2	2	1	...	13	60
Mingo Coal and Coke Company (No. 2)	50	......	5	...	......	...	1	1	...	......	57	...	1	...	1	...	...	...	...	3	......	...	5	62
Fork Ridge Coal and Coke Company	25	......	3	...	......	...	1	...	1	......	30	...	1	..	1	...	...	1	2	2	......	...	7	37
Bryson Mountain	21	......	4	...	1	...	1	1	2	......	30	1	1	1	...	...	1	2	1	2	......	...	9	39
Reliance Coal and Coke Company	52	......	5	...	2	...	1	1	2	......	63	1	1	...	..	...	1	2	1	3	3	...	12	75

The report of number of employes is not complete, many of the operators refusing to give the desired data to make this table complete.

PRICES PAID FOR SUPPLIES AND PROVISIONS BY EMPLOYES AT COMPANIES' STORES.

ME OF OPERATOR.	PRICES PAID BY EMPLOYES AT COMPANY'S STORE.					PRICE OF PROVISIONS AT COMPANY'S STORE.											
	Powder, per keg.	Miner's Oil, per gal.	Picks, each.	Shovels, each.	Fuse, per 100 ft.	Flour.	Sugar, per pound.	Coffee, per pound.	Tea, per pound.	Potatoes, per bushel.	Meal, per bushel.	Side meat, per pound.	Shoes, per pair.	Boots, per pair.	Cheese, per pound.	Lard, per pound.	Kerosene oil, per gallon.
Battle Creek Coal Co.	......	......	......	......	......	$4 50 per barrel	$0 05	$ 0 25	$ 0 60	$ 0 50	$ 0 40	$0 08	$ 1 25	......	$ 0 20	$ 0 10	$ 0 20
New Soddy Coal Co.	$ 1 80	$ 0 60	$ 0 65	$ 1 00	$ 0 80	......	......	......	......	......	......	......	......	......	......	......	......
Sale Creek Coal & Coke Co.	......	75	50	1 40	......	5 00 per barrel	06¼	25	50	50	40	08⅛	1 25–1 65	$ 3 50	17	10	......
Fox Coal & Coke Co.	2 00	80	70	1 50	60	4 80 "	06	25	60	......	......	10	1 50	......	20	10	20
Dayton C. & I. Co., Richland	......	......	......	......	......	5 00 "	06	25	60	75	60	10	1 00–3 00	1 50–3 00	20	10	20–25
" " " Nelson																	
" " " Dixon S.																	
Roane Iron Co.	1 90	50	60	1 00	30	4 80 "	06	25	50	50	50	08⅛	......	......	17½	8⅓	20
Glen Mary Coal & Coke Co.	1 80	60	75	1 00	75	5 00 "	06¼	25	40	50	70	10	1 50	......	20	10	20
Paint Rock Coal & Coke Co.	2 00	80	25	1 40	1 00	......	......	......	......	......	......	......	......	......	......	......	......
Oliver Coal Co.	1 75	75	40	1 00	40	2 40 per 100 lbs	06¼	25–30	50	40	40	10	1 25–1 75	1 50–2 50	20	13½	20
Queener Bros.	1 75	75	50	1 00	40	2 40 "	07	25	50	40	50	10	1 00–2 50	1 75–2 50	20	10	20
Indian Creek Coal Co.	1 75	75	85	1 25	75	......	......	......	......	......	......	......	......	......	......	......	......
Eagle Coal Co.	1 75	75	75	80	80	......	......	......	......	......	......	......	......	......	......	......	......
Black Diamond Coal Co.—																	
Beech Grove	1 50	75	60	75–1 00	25–40c	3 00 per 100 lbs	08⅓	25	60	60	65	12½	1 50	2 00	20	12½	20
Shamrock																	
Central																	
Royal Coal & Coke Co.	1 50	60	50–80	1 00	30	$4–$6 per barrel	06¾	25	50	40–1 00	70–80	10–12½	.65–5 00	1 00–6 00	20	10	20
Pine Mountain Coal Co.	1 50	60	60	50–75	1 00	4 25 "	06¼	25	60	50	50	10	1 25–2 50	2 00–2 75	15–20	12½	15–20
Standard Coal & Coke Co.	2 75	80	75	1 25	......	5 00 "	06	25	......	60	40	12½	......	......	20	12½	20
Wooldridge Jellico Coal Co.	1 60	60	50–75	75–1 00	40	5 00 "	7–08⅓	25–30	50–1 00	75	70	9–10	1 25–5 80	......	20	12½	20
Indian Mountain Coal Co.	1 50	70	75	1 00	80	75 per 24 lbs	6¼–7¼	25–35	60	70	40	10	1 40–3 50	......	20	12½	20
Italian Blue Gem Coal Co.	1 50	60	60	60	1 00	5 00 per barrel	06½	25–30	20–50	50–75	70	10	1 00–3 00	......	20	10	20
Mingo Coal & Coke Co., No. 1	......	80	90	1 00	......	75 per 24 lbs	07½	30	80	1 00	45	12½	1 00–5 00	......	20	12½	20
" " " " No. 2																	
Fork Ridge Coal & Coke Co.	......	......	......	......	......	60 "	07	30	60	......	59	10	1 65	......	20	16	25
Bryson Mountain	......	80	50–75	90–1 10	......	5 50 per barrel	07	25	65	80	......	10	......	......	20	12½	20

STATISTICS TENNESSEE MINES—ACCIDENTS IN 1895, FATAL AND NON-FATAL.

NAME OF COMPANY.	LOCATION.	Date.	NAME.	Age.	Occupation.	Married or Single.	Killed or Injured.	CAUSE.
Bon Air Coal & Coke Co	Bon Air, White County	Feb. 23	"Bud" Frazier	23	Miner	Mar	Killed	By a blast.
Black Diamond Coal Co	Coal Creek, Anderson County	Jan. 21	Robert Jackson	17	Miner	Sin	Killed	Fall of coal rash.
Black Diamond Coal Co	Coal Creek, Anderson County	March 11.	Samuel R. Brooks	25	Miner	Sin	Injured	Burned by fire-damp.
Black Diamond Coal Co	Coal Creek, Anderson County	April 22	Wm. Fain (col)	23	Miner	Sin	Injured	Right leg broken by fall of "horse-back."
Black Diamond Coal Co	Coal Creek, Anderson County	June 10	John Smith	45	Miner	...	Injured	Toes mashed by fall of fire-clay and coal.
Black Diamond Coal Co	Coal Creek, Anderson County	June 17	James W. Ayers	38	Miner	Mar	Killed	Fall of slate.
Black Diamond Coal Co	Coal Creek, Anderson County	Dec. 31	Frank Sharp	26	Driver	Mar	Injured	Leg broken below the knee.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	April 2	George McMillan	40	Miner	...	Killed	Fall of coal.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	May 8	James M. Head	...	Mine Boss	...	Injured	Burned by fire-damp.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Oct. 16	Marion Green	...	Miner	...	Injured	Burned by explosion of fire-damp.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Oct. 16	Geo. Henderson	...	Miner	...	Injured	Burned by explosion of fire-damp.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Nov. 25	John Gurgauns	...	Miner	...	Injured	Fall of top coal.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 7.	Mose Holman (c)	...	Miner	...	Injured	Explosion of dynamite.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	W. J. Alexander.	26	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	W. J. Miller	..	Miner's laborer	...	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Josh. Bennett	30	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	H. B. Williams	...	Miner's laborer	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Thomas Lane	40	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Willie Lane	20	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Wm. Henderson.	40	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	L. T. Ferguson	30	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Arthur McMillan	15	Miner's laborer	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	W. H. Davis	35	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	John Manis	40	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Jno. Westfield (c)	30	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Norris Small (c)	...	Miner	...	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	John Leach (col)	22	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Sam Wilson (col)	22	Miner's laborer	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Thos. Hawkins	35	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	J. A. Ivester	40	Miner	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Will Roddy (col).	18	Miner's laborer	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Robert Jewell	18	Miner's laborer	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Floyd Jewell	22	Miner's laborer	Mar	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Robt. Hamilton	24	Miner	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Elder Morgan	14	Trapper	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Chas. Washburn	21	Driver	Sin	Killed	Coal dust explosion.
Dayton Coal & Iion Co (lim)	Dayton, Rhea County	Dec. 20	Liney Walker	22	Driver	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	John Able	20	Driver	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20,	Cyrus Alexander	18	Driver	Sin	Killed	Caal dust explosion,

CLASSIFICATION OF EMPLOYES IN TENNESSEE MINES, 1895.

NAME OF COMPANY OR OPERATOR.	NUMBER OF EMPLOYES INSIDE.											NUMBER OF EMPLOYES OUTSIDE.													Grand Total Number of Employes.
	Miners.	Miners' laborers.	Drivers.	Trip riders.	Company men Inside.	Timber men.	Track men.	Furnace men.	Trappers.	Other Employes.	Total men Inside.	Foremen.	Blacksmiths.	Carpenters.	Engineers.	Firemen.	Office men.	Store men.	Timber men.	Tip men.	Company men Outside.	Machinists.	Total men Outside.	
Bon Air Coal and Coke Company	120	31	16	...	......	...	2	...	6	94	269	...	4	2	5	4	4	3	...	...	20	...	42	311
Tennessee Coal and Iron Company (Sewanee), includes all mines operated in Grundy County	235	113	47	4	2	...	15	4	8	......	428	4	5	3	9	2	7	7	9	17	20	7	90	518
Monterey Coal Company	25	......	1	...	2	..	1	...	...	......	29	...	1	...	1	...	...	...	...	2	1	...	5	34
Battle Creek Coal Company	......	......	...	...	......	...	...	...	...	......	25	...	...	...	...	...	1	1	...	...	5	...	7	32
Tennessee Coal, Iron & Railroad Co. (Whitwell)	200	41	31	2	17	9	10	8	18	......	336	2	4	6	...	...	2	5	8	17	6	...	50	386
Ætna Coal Company	115	11	18	1	6	...	2	1	3	......	155	1	2	3	4	1	1	3	...	20	51	...	86	241
New Soddy Coal Company	203	60	23	1	6	3	2	2	19	......	319	1	2	1	3	3	2	8	4	6	4	...	34	353
Sale Creek Coal and Coke Company	53	15	6	1	4	1	3	...	4	......	87	1	1	3	2	1	1	3	2	4	7	...	25	112
Fox Coal and Coke Company	32	8	2	...	1	...	...	...	1	......	44	...	1	...	...	...	1	1	..	2	6	...	11	55
Dayton Coal & Iron Co., Limited (Richland)	80	12	10	...	......	...	2	1	4	......	109	1	1	1	...	...	...	...	3	6	......	...	12	121
Dayton Coal & Iron Co., Limited (Nelson)	72	14	22	3	4	...	7	3	6	......	131	...	2	1	1	2	2	...	...	5	7	...	20	151
Dayton Coal and Iron Co., Limited (Dixon Slope)	......	......	...	...	......	...	...	..	...	......	......	...	...	...	2	2	...	...	..	...	......	...	4	4
Roane Iron Company	100	20	17	4	4	5	7	...	4	59	220	...	3	2	7	5	2	...	5	11	......	...	35	255
Daisy Coal Company	15	......	...	...	......	...	...	...	...	......	15	...	...	...	...	...	...	...	...	...	......	...	......	15
Glen Mary Coal and Coke Company	39	5	6	2	......	1	2	1	3	43	102	2	3	5	3	1	2	3	3	11	7	...	40	142
Paint Rock Coal and Coke Company	120	......	16	2	......	...	2	1	6	2	149	2	1	1	2	3	2	2	5	7	2	...	27	176
State of Tennessee Mines (convicts)	168	......	9	...	......	3	7	1	5	31	224	2	5	76	...	...	4	...	8	10	13	...	118	342
Oliver Coal Company	54	10	6	...	3	...	...	...	2	3	78	..	...	...	...	...	...	...	...	...	......	...	......	78
Queener Bros	48	......	6	...	......	...	...	...	1	......	......	...	...	...	...	...	1	1	...	1	2	...	5	58
Winter's Gap Coal Company	18	3	...	..	1	...	...	1	1	......	23	...	...	...	...	..	1	...	...	2	......	...	3	26
Indian Creek Coal Company	25	7	2	...	......	...	1	...	...	......	35	...	1	...	...	...	...	...	3	1	1	...	6	41
Black Diamond Coal Co. (Beech Grove) Black Diamond Coal Co. (Shamrock) Black Diamond Coal Co. (Central)	169	......	20	...	8	6	2	2	8	......	215	..	2	2	2	1	3	5	...	9	......	...	24	239

Eagle Coal Company	16	4	2	...	......	...	...	...	...	......	22	...	...	...	...	...	...	...	...	...	......	...	......		22
Tennessee Paving Brick Company	25	......	...	...	......	...	...	...	...	......	25	...	...	...	...	...	...	...	...	...	......	...	......		25
Royal Coal and Coke Company	125	......	9	6	12	...	2	...	4	......	158	1	1	1	1	2	2	2	...	3	......	...	13		171
Royal Coal and Coke Company (Cambria)	50	15	3	1	1	...	1	1	1	5	78	1	1	...	1	1	...	1	...	2	5	...	12		90
Buckeye Coke Company	80	......	5	1	3	1	2	1	2	......	95	1	1	1	1	1	1	2	...	2	...	...	10		105
Pine Mountain Coal Company	25	......	4	...	2	...	...	...	...	......	31	...	1	...	...	...	...	2	...	2	......	...	5		36
Standard Coal and Coke Company	140	......	..	11	27	...	5	1	5	......	189	1	2	...	1	1	1	2	3	11	......	...	22		211
Wooldridge Jellico Coal Company	175	......	18	...	17	...	8	1	1	......	220	1	2	2	2	1	2	3	...	6	4	...	23		243
Falls Branch Jellico Coal Company	60	......	8	...	......	...	2	...	...	......	......	...	1	2	1	1	2	2	6	5	2	...	22		92
Indian Mountain Coal Company	80	......	3	...	1	1	1	1	2	......	88	1	1	...	...	...	1	1	...	5	1	...	11		99
Blue Gem Jellico Coal Company	40	12	3	1	2	1	...	...	...	......	59	1	1	...	...	...	1	1	2	3	......	...	9		68
Mingo Coal and Coke Company (No. 1)	41	......	4	...	......	...	1	1	...	....	47	...	1	2	1	1	1	2	2	2	1	...	13		60
Mingo Coal and Coke Company (No. 2)	50	......	5	...	......	...	1	1	...	......	57	...	1	...	1	...	...	...	...	3	......	...	5		62
Fork Ridge Coal and Coke Company	25	......	3	...	......	...	1	...	1	......	30	...	1	..	1	...	...	1	2	2	......	...	7		37
Bryson Mountain	21	......	4	...	1	...	1	1	2	......	30	1	1	1	...	...	1	2	1	2	......	...	9		39
Reliance Coal and Coke Company	52	......	5	...	2	...	1	1	2	......	63	1	1	...	..	...	1	2	1	3	3	...	12		75

The report of number of employes is not complete, many of the operators refusing to give the desired data to make this table complete.

PRICES PAID FOR SUPPLIES AND PROVISIONS BY EMPLOYES AT COMPANIES' STORES.

NAME OF OPERATOR.	PRICES PAID BY EMPLOYES AT COMPANY'S STORE.					PRICE OF PROVISIONS AT COMPANY'S STORE.											
	Powder, per keg.	Miner's Oil, per gal.	Picks, each.	Shovels, each.	Fuse, per 100 ft.	Flour.	Sugar, per pound.	Coffee, per pound.	Tea, per pound.	Potatoes, per bushel.	Meal, per bushel.	Side meat, per pound.	Shoes, per pair.	Boots, per pair.	Cheese, per pound.	Lard, per pound.	Kerosene oil, per gallon.
Battle Creek Coal Co.	....	....	....	....	....	$4 50 per barrel	$0 05	$ 0 25	$ 0 60	$ 0 50	$ 0 40	$0 08	$ 1 25	....	$ 0 20	$ 0 10	$ 0 20
New Soddy Coal Co.	$ 1 80	$ 0 60	$ 0 65	$ 1 00	$ 0 80	....	....	....	....	....	....	....	....	....	....	....	....
Sale Creek Coal & Coke Co.	....	75	50	1 40	....	5 00 per barrel	06¼	25	50	50	40	08⅛	1 25–1 65	$ 3 50	17	10	....
Fox Coal & Coke Co.	2 00	80	70	1 50	60	4 80 "	06	25	60	....	....	10	1 50	....	20	10	20
Dayton C. & I. Co., Richland	....	....	....	....	....	5 00 "	06	25	60	75	60	10	1 00–3 00	1 50–3 00	20	10	20–25
" " " Nelson																	
" " " Dixon S.																	
Roane Iron Co.	1 90	50	60	1 00	30	4 80 "	06	25	50	50	50	08⅛	....	....	17½	8⅛	20
Glen Mary Coal & Coke Co.	1 80	60	75	1 00	75	5 00 "	06¼	25	40	50	70	10	1 50	....	20	10	20
Paint Rock Coal & Coke Co.	2 00	80	25	1 40	1 00	....	....	....	....	....	....	....	....	....	....	....	....
Oliver Coal Co.	1 75	75	40	1 00	40	2 40 per 100 lbs	06¼	25–30	50	40	40	10	1 25–1 75	1 50–2 50	20	13½	20
Queener Bros.	1 75	75	50	1 00	40	2 40 "	07	25	50	40	50	10	1 00–2 50	1 75–2 50	20	10	20
Indian Creek Coal Co.	1 75	75	85	1 25	75	....	....	....	....	....	....	....	....	....	....	....	....
Eagle Coal Co.	1 75	75	75	80	80	....	....	....	....	....	....	....	....	....	....	....	....
Black Diamond Coal Co.—																	
Beech Grove	1 50	75	60	75–1 00	25–40c	3 00 per 100 lbs	08⅓	25	60	60	65	12½	1 50	2 00	20	12½	20
Shamrock																	
Central																	
Royal Coal & Coke Co.	1 50	60	50–80	1 00	30	$4–$6 per barrel	06¾	25	50	40–1 00	70–80	10–12½	.65–5 00	1 00–6 00	20	10	20
Pine Mountain Coal Co.	1 50	60	60	50–75	1 00	4 25 "	06¼	25	60	50	50	10	1 25–2 50	2 00–2 75	15–20	12½	15–20
Standard Coal & Coke Co.	2 75	80	75	1 25	....	5 00 "	06	25	....	60	40	12½	....	....	20	12½	20
Wooldridge Jellico Coal Co.	1 60	60	50–75	75–1 00	40	5 00 "	7–08⅓	25–30	50–1 00	75	70	9–10	1 25–5 80	....	20	12½	20
Indian Mountain Coal Co.	1 50	70	75	1 00	80	75 per 24 lbs	6¼–7¼	25–35	60	70	40	10	1 40–3 50	....	20	12½	20
Italian Blue Gem Coal Co.	1 50	60	60	60	1 00	5 00 per barrel	06½	25–30	20–50	50–75	70	10	1 00–3 00	....	20	10	20
Mingo Coal & Coke Co., No. 1	....	80	90	1 00	....	75 per 24 lbs	07½	30	80	1 00	45	12½	1 00–5 00	....	20	12½	20
" " " " No. 2																	
Fork Ridge Coal & Coke Co.	....	....	....	....	....	60 "	07	30	60	....	59	10	1 65	....	20	16	25
Bryson Mountain	....	80	50–75	90–1 10	....	5 50 per barrel	07	25	65	80	....	10	....	....	20	12½	20

STATISTICS TENNESSEE MINES—ACCIDENTS IN 1895, FATAL AND NON-FATAL.

NAME OF COMPANY.	LOCATION.	Date.	NAME.	Age.	Occupation.	Married or Single.	Killed or Injured.	CAUSE.
Bon Air Coal & Coke Co.	Bon Air, White County	Feb. 23.	"Bud" Frazier	23	Miner	Mar.	Killed	By a blast.
Black Diamond Coal Co.	Coal Creek, Anderson County	Jan. 21.	Robert Jackson	17	Miner	Sin	Killed	Fall of coal rash.
Black Diamond Coal Co.	Coal Creek, Anderson County	March 11.	Samuel R. Brooks	25	Miner	Sin	Injured	Burned by fire-damp.
Black Diamond Coal Co.	Coal Creek, Anderson County	April 22.	Wm. Fain (col)	23	Miner	Sin	Injured	Right leg broken by fall of "horse-back."
Black Diamond Coal Co.	Coal Creek, Anderson County	June 10.	John Smith	45	Miner	...	Injured	Toes mashed by fall of fire-clay and coal.
Black Diamond Coal Co.	Coal Creek, Anderson County	June 17.	James W. Ayers	38	Miner	Mar.	Killed	Fall of slate.
Black Diamond Coal Co.	Coal Creek, Anderson County	Dec. 31.	Frank Sharp	26	Driver	Mar.	Injured	Leg broken below the knee.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	April 2.	George McMillan	40	Miner	...	Killed	Fall of coal.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	May 8.	James M. Head	...	Mine Boss	...	Injured	Burned by fire-damp.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Oct. 16.	Marion Green	...	Miner	...	Injured	Burned by explosion of fire-damp.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Oct. 16.	Geo. Henderson.	...	Miner	...	Injured	Burned by explosion of fire-damp.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Nov. 25.	John Gurgauns	...	Miner	...	Injured	Fall of top coal.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 7.	Mose Holman (c)	...	Miner	...	Injured	Explosion of dynamite.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	W. J. Alexander.	26	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	W. J. Miller	..	Miner's laborer	...	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Josh. Bennett	30	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	H. B. Williams	...	Miner's laborer	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton. Rhea County	Dec. 20.	Thomas Lane	40	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Willie Lane	20	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Wm. Henderson.	40	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	L. T. Ferguson	30	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Arthur McMillan	15	Miner's laborer	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	W. H. Davis	35	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	John Manis	40	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Jno. Westfield (c)	30	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Norris Small (c).	...	Miner	...	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	John Leach (col)	22	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Sam Wilson (col)	22	Miner's laborer	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Thos. Hawkins	35	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	J. A. Ivester	40	Miner	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Will Roddy (col).	18	Miner's laborer	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Robert Jewell	18	Miner's laborer	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Floyd Jewell	22	Miner's laborer	Mar.	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Robt. Hamilton	24	Miner	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Elder Morgan	14	Trapper	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Chas. Washburn	21	Driver	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Liney Walker	22	Driver	Sin	Killed	Coal dust explosion.
Dayton Coal & Iion Co (lim)	Dayton, Rhea County	Dec. 20.	John Able	20	Driver	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20.	Cyrus Alexander	18	Driver	Sin	Killed	Caal dust explosion.

STATISTICS TENNESSEE MINES—*Continued.*

NAME OF COMPANY.	LOCATION.	Date.	NAME.	Age.	Occupation.	Married or Single.	Killed or Injured.	CAUSE.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	James Johnson	22	Driver	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Dec. 20	Wm. Brotherton.	23	Driver	Sin	Killed	Coal dust explosion.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Feb. 25	W. Coleman	...	Miner	....	Injured	By fire-damp.
Dayton Coal & Iron Co (lim)	Dayton, Rhea County	Feb. 25.	Lihu Baker	...	Miner	....	Injured	By fire-damp.
Dayton Coal & Iron Co (lim(	Dayton, Rhea County	Feb. 25	J. S. Coleman	...	Miner	....	Injured	By fire damp.
Ducktown Sulphur, Copper & Iron Co	Isabella, Polk County	April 13	William Carter	26	Miner	Mar	Killed	By train.
Ducktown Sulphur, Copper & Iron Co	Isabella, Polk County	May 15	Clifton Baxter.	28	Machine miner	....	Injured	Explosion of dynamite.
Glen Mary Coal & Coke Co	Glen Mary, Scott County	Oct. 18	M. Tomlinson	25	Miner	Mar	Killed	Powder prematurely discharged.
Glen Mary Coal & Coke Co	Glen Mary, Scott County	Oct. 18	Joseph Minus	25	Miner	Mar.	Injured	Powder prematurely discharged.
Hardwick Lead Mines	Bradley County	May 25	L. R. Smith	56	Miner	Mar	Killed	Falling in shaft.
Pittsburg & Tenn. Copper Co	Ducktown, Polk County	May 26	Chas. Ferguson.	...	Miner	Mar	Killed	Caught between cage and timber.
Roane Iron Co	Rockwoon, Roane County	Aug. 7	Dan'l McPherson	...	Miner	Mar	Injured	Burned by fire-damp.
Roane Iron Co	Rockwood, Roane County	Aug. 28	Willie Richards.	17	Miner	Sin	Injured	Riding up the slope.
Roane Iron Co	Rockwood, Roane County	Oct. 1	"Bud" Simpson.	...	Miner	....	Injured	Trying to catch on to a trip at drift switch.
Roane Iron Co	Rockwood, Roane County	Oct. 17	William Brymer.	...	Miner	....	Killed.	Fall of coal.
Royal Coal & Coke Co	Coal Creek, Anderson County	Oct. 11	Wm. McComb (c)	27	Miner	....	Killed	Fall of slate.
Sale Creek Coal & Coke Co	Sale Creek, Hamilton County	Dec. 10	James Clouse	...	....	....	Injured	(Machinery fell from car. Not in company's employ.)
Standard Coal & Coke Co	Newcomb, Campbell County	Sept. 10	Elias Weaver (c).	35	Miner	Sin	Killed	Fall of slate.
Watts Iron Ore Mines	Gumberland Gap, Claiborne Co	Dec. 3	William Carter	...	Miner	....	Injured	Struck by a "dummy" car.
Wooldridge Jellico Coal Co	Newcomb, Campbell County	Nov. 16	Wm. Tweed	29	Miner	Mar	Killed	"Horse-back' fell on him.

SCALE OF PRICES FOR THE JELLICO DISTRICT,

YEAR 1895 AND 1896, ENDING APRIL 30, 1896.

CENTRAL JELLICO COAL CO., EAST TENNESSEE COAL CO., FALLS BRANCH JELLICO COAL CO., JELLICO COAL MINING CO., JELLICO & BIRD EYE COAL CO., KENTUCKY BIRD EYE COAL CO., HYWEL DAVIES COAL CO., THE PROCTOR COAL CO., STANDARD COAL & COKE CO., WOOLDRIDGE JELLICO COAL CO.

The following scale was agreed to at a joint meeting of operators and miners held at Jellico on April 30, 1895:

GRADES OF COAL.

There shall be five grades of coal.

No. 1—Under 2½ feet.

No. 2—2½ feet to 2 feet 9 inches.

No. 3—2 feet 9 inches to 3½ feet.

No. 4—3½ feet to 4½ feet.

No. 5—4½ feet and over.

PRICES.

The price for No. 1 shall be 75 cents.

The price for No. 2 70 cents.

The price for No. 3, 65 cents.

The price for No. 4, 60 cents.

The price for No. 5, 55 cents per ton of 2,000 pounds in weigh-box.

The price for No. 5 shall only be paid when such coal screens 75 per cent. of lump coal in weigh-box.

SCREENS.

Screens shall not exceed 72 superficial feet in area, with 1¼ inch space between the bars—pitch of screens to be so regulated from time to time, as the necessity arises, so that the coal will run over them.

MEASUREMENTS.

It is understood that only coal shall be measured, and not impurities. The mining seam and sand band shall not be considered impurities, if measured.

TRACKS.

The company shall lay all tracks.

CARS.

The company shall handle all cars in rooms, except in robbing back entries the miner shall deliver at a safe place on entries all coal mined in entry stumps and such coal that be left in pillars for support of entry and airway adjacent to stumps, as directed by mine boss. But any company to have the right to arrange with its miners to push coal, for proper compensation, where local conditions make it necessary, and that 5 cents per ton shall be the least price for it when it can be agreed upon between bank boss and miners. In case no agreement is made the bank committee shall be called in. This clause not to affect more than fifteen men in any mine at any one time.

YARDAGE.

The standard price for slate entries shall be $2.15 per yard; but when both top and bottom are blasted the price shall be $2.65 per yard. Rock, or sandstone entries, $3.05 per yard. The company may blast any or all narrow work if price is not satisfactory. Entries, airways and all narrow work in coal, when used for entries or airways, shall be 87½ cents per yard; but whenever the slate parting occurs in the coal, and no top or bottom is blasted, the price shall be $1.30 in entries and airways when the slate is loaded out and does not exceed 9 inches; over 9 inches and up to 18 inches in entries and rooms 5 cents per ton extra on the coal shall be paid.

ROOM TURNING.

Turning rooms shall be $2 in high coal, $2.25 in medium coal, $2.50 in low coal, and $3.75 for double rooms in all coal when ordered.

TIMBER.

All timber shall be placed convenient to the mouth of the mine, but miners must select their timbers and place convenient to the track and number them, then the driver shall bring them at his earliest convenience after being notified; but it must be distinctly understood that a miner must not, under any consideration, continue to work if a delay of delivery endangers his safety.

LABOR.

Ten hours shall constitute a day's work, and all day labor shall be paid for by the hour on the following scale:

Drum-man	15¼ cents per hour.
Knucklemen	13 cents per hour.
Chute	13 cents per hour.
Head Trackman	19¼ cents per hour.
Assistant Trackman	15¼ cents per hour.
Drivers, men	15¼ cents per hour.
Drivers, boys	10¼ cents per hour.
Spike-team drivers	17¼ cents per hour.
Trappers	4½ to 5½ cents per hour.
Oiler	4¼ to 6½ cents per hour.
Couplers	11 cents per hour.
Furnacemen	13 cents per hour.
Pushers, men	15 cents per hour.
Pushers, boys	10 cents per hour.

RENTS.

All rents shall be the same as last year.

HOUSE FUEL.

Lump coal to be $1.50 per 2-horse wagon load.

Nut coal $1.00 per 2-horse wagon load.

When an employe does not buy coal, he shall pay 50 cents per month in the spring and summer and $1.00 in the fall and winter.

When the coal is thrown off from Railroad cars the price shall be $2.00 per month in winter, $1.00 in spring and fall and 50 cents for summer.

ARBITRATION.

There shall be a board of arbitration and conciliation to adjust all disputes arising under this agreement, composed of three on each side, with power to select an umpire, and their decision shall be final and binding on all parties to this agreement. The board shall consist of the following: J. C. Brooks, P. Francis, John Phillips, on part of operators; and on part of miners, Albert Owens, J. R. Horsfield and G. G. Young. Under no consideration shall work cease until the arbitration board decides on the question at issue.

DEATHS.

In case of death in the family of any employe, or upon the death of any employe, the following rule shall prevail:

Death by accident in or around any mine, such mine will lie idle until after the funeral. Death of a grown person from natural causes, the mine will lie idle on the afternoon of the funeral. On the death of a child or minor, the work will not lie idle, but those wishing to attend the funeral may lay off to do so.

PICK SHARPENING.

Forty cents per month; but if mine does not run over one-fourth of month, 10 cents; one-half month, 20 cents; three-fourths month, 30 cents.

PAY DAY.

Pay day shall be on the first Saturday after the 10th of each month for all work done in the preceding month, less charges; but on presentation of five days' notice by any employe, he shall be entitled to full settlement at expiration of such notice.

WEIGHMASTER.

The weighman and check-weighman shall check off dues from all who authorize them in writing to do so, not to exceed 75 cents per month from each man in excess of the check-weighman's salary after medicines and rents for current month are charged.

BLACK-LISTING.

No man to be black-listed who does not agree to have dues collected.

TIME OF CONTRACT.

This contract expires April 30, 1896.

J. R. WOOLDRIDGE,
JOHN W. COX,
Chairmen.
J. C. BROOKS,
J. R. HORSFIELD,
Secretaries.

THE PETROLEUM FIELD OF TENNESSEE.

The existence of petroleum in this State has been known for thirty years, and, at one time, considerable quantities were shipped from wells in Putnam and Overton counties, but the long distance from railway transportation necessitated an expensive wagon haul to McMinnville and other railway points, and the long distance by rail to the refineries, prevented any extensive development at that time.

The discovery of petroleum in Pennsylvania and Ohio about the same time as in this State, and the more favorable situation of those fields to markets and refineries were the principal causes that suspended the work of development in this State.

Since the first discovery numerous attempts have been made at different points in this field to find petroleum in paying quantities, with a great variety of results, but no important development was consummated until the fall of 1894.

The extent of the field has not been truly defined, but the boundary can be outlined approximately by the following natural boundaries, to wit: Beginning at Cumberland Gap, in Claiborne County, the southwest corner of Virginia; thence south-westwardly with the eastern escarpment of the Cumberland Mountains to the Tennessee River, near Chattanooga; thence following said river through northern Alabama and Tennessee, into Kentucky, to the southern out-crop of the western coal field of that State; thence eastwardly with said out-crop line to the Cumberland River; thence up the said river to the point of beginning, excepting that part of the above territory in Tennessee known as the "Central Basin," which comprises the following territory: Bedford, Williamson, Marshall, Rutherford, Davidson, Wilson and Maury counties, also parts of the counties of Lincoln, Giles, Smith, DeKalb, Cannon, Moore and Franklin. The above described area is considered practically barren of petroleum, for the reason of the erosion that has occurred in the formation of the basin above referred to.

By reason of the constantly increasing consumption of petroleum and its products, the constantly decreasing output of other oil fields, and the recent discoveries of high-grade petroleum in paying quantities in Scott, Morgan, Fentress, Pickett, Putnam and Overton counties, the full and rapid development of the field in this State is assured. Transportation facilities have been improved to a considerable extent since the time of the first discovery and suspension of the development. The Cincinnati Southern Railroad, Nashville & Knoxville Railroad, Southern Railroad, Nashville, Chattanooga & St. Louis Railway, Harriman & Northeastern Railroad, and others have been completed. The Tennessee Central Railroad is now in course of construction through the field. Beside, the improvement of navigation on the Cumberland and Tennessee rivers by the United States government, are all common and important factors in the inauguration of the development of this important resource of this State.

The present work of development is confined to Pickett, Overton, Putnam, Fentress, Morgan and Scott counties, and the results in these counties are extremely satisfactory, considering the shallow depths that the wells were drilled to reach oil of good quality.

Companies that have been engaged in the business in other fields have leased or purchased large tracts of land, and commenced work on their wells. Several wells have reached the first "oil sand," and produce various quantities, some estimated as high as seven hundred barrels per day.

Numerous companies have been formed to operate in these counties and in other parts of the field. In most cases they lease the lands for a small, stipulated annual rental, contracting to commence work on the wells within a certain, fixed time, and agreeing to give the operator a certain percentage of the oil when found, the land owners paying all taxes on the lands, and maintaining all rights to surface not needed in operating the wells.

Statistics as to the number of wells, depth, capacity, exact location, name of owners, etc., could not be obtained without a personal visit to the field. The field promises to be one of great activity during the year 1896, and arrangements will be made to obtain the statistics of the production, etc., for next report.

BUSINESS CONDITIONS.

A careful review of business conditions for the United States during the year 1895, as compiled by Dun's Mercantile Agency, shows some surprising and very gratifying facts in regard to the conditions of business throughout the South during the past year, as compared with other sections of the country. It is encouraging, indeed, for this section to note that there were fewer failures in the South, in proportion to capital invested, than in any section of the Union.

For instance, there were 50 per cent. more failures, with liabilities more than twice as great, in the States of New York, New Jersey and Pennsylvania, than in the whole thirteen States of the South.

The following are some comparative figures that are of especial interest:

In New York, New Jersey and Pennsylvania, during 1895, there were a total of 3,471 failures, with assets amounting to $33,182,188 and liabilities amounting to $60,577,969.

In the thirteen States of the South—Maryland, Delaware, Virginia, West Virginia, North Carolina, South Carolina, Florida, Georgia, Alabama, Mississippi, Louisiana, Tennessee and Kentucky—there were but 2,355 failures, with assets amounting to $19,703,921 and liabilities amounting to $26,180,502. This is a material decrease from the figures of 1894 for the same States, which were as follows: Total number of failures, 2,625; assets, $25,454,259; liabilities, $31,230,544.

The classified failures of these thirteen Southern States for 1894 and 1895 were as follows:

1894—Manufacturing—Number of failures, 293; liabilities, $9,860,361. Trading—Number of failures, 2,304; liabilities, $19,450,990. Other commercial failures, 28; liabilities, $1,919,193. Bank failures, 12; liabilities, $935,254.

1895—Manufacturing—Number of failures, 275; liabilities, $7,136,160. Trading—Number of failures, 2,055; liabilities, $18,233,191. Other commercial failures, 25; liabilities, $811,151. Bank failures, 11; liabilities, $2,374,368.

The following are the figures for the State of Tennessee:

1894—Total number of failures, 347; liabilities, $3,141,247.

1895—Total number of failures, 273; assets, $2,416,622; liabilities, $2,646,632.

The following is a classified list of the failures in the State during the year 1895:

Manufacturing—Number of failures, 23; liabilities, $632,293. Trading—Number of failures, 247; liabilities, $1,812,367. Other commercial failures, 3; liabilities, $201,770. Bank failures, 1; liabilities, $107,800.

The excess of manufacturing failures during the year 1895 occurred within a very narrow district. More than the entire increase appears in New York, $8,000,000; Illinois, $4,300,000; Rhode Island, $2,300,000; Connecticut, $80,0000; New Jersey, $600,000; Ohio, $1,100,000; and Michigan, $1,400,000.

A very few other States show a small increase, but the rest a decrease.

In the seven States above named the increase in amount of failures was $18,570,586, or 62.6 per cent. over 1894, while in all the other States, taken together, there was a decrease of $12,024,288, or 31.9 per cent.

During the year just past the South fared better than any other section, as these figures indisputably show.

THE LABOR MOVEMENT.

The first labor organization in America was said to have been organized in New York in the year 1805. From that time up to the civil war their advance was very slow, very few of the trades being organized, but since the close of the war the organizations have advanced rapidly.

In the South labor organizations were not known (with the possible exception of the printers and moulders) till after 1870, but at the present time there is not a Southern city but where organizations exist, and the labor question is now well established, and having for its ostensible object, at least, the betterment of the condition of the laboring classes, it will steadily grow as the prosperity of the South increases.

Of the numerous elements on which the prosperity and development of industry depends, to a large extent, trade organizations and labor disturbances are the most potent. Before organizations existed employers had a great deal of trouble with their employes, for arbitration was out of the question, but since the working people have formed themselves into law-abiding organizations, the differences, as a rule, are settled by arbitration, thus saving the expense involving the stoppage of industries, and sometimes saving the prosperity of a community.

In the larger cities of the State of Tennessee every trade and calling (with a few exceptions) is thoroughly organized, and to the credit of the organizations very few strikes have occurred. The only strikes of any interest that have occurred during the past year were the miners in the employ of the Royal Coal & Coke Co., of Coal Creek district; the tailors in the employ of Berry, Bailey & Co., of Nashville, and the coopers in the employ of R. Wernet, Henry Mocker, and the Andrews Cooperage Works, of Nashville, the full report of which will be found elsewhere.

At the suggestion of the working people of the State the Legislature, at its various sessions, has passed a number of laws in their interest, viz: 1891—"To create a Bureau of Labor, Statistics, and

Mines, and to provide for the inspection of mines." 1891—"To set apart the first Monday in September of each and every year as a legal holiday, to be known as Labor Day." 1891—"Making it a misdemeanor for any person to carry on the business of barbering on Sunday." 1891—"Providing a prior lien for, and giving greater security to, contractors, sub-contractors, laborers, material men, engineers, and all other persons rendering valuable services, professional or otherwise, in the location, construction, repairs, and equipping of any railroad in the State, and to amend chapter 220 of an Act passed March 20, 1883, entitled 'An Act to protect contractors, mechanics, laborers, and engineers who perform work or furnish materials for the construction or repair of railroads.'" 1891—"To compel all persons, firms or corporations, and companies that are engaged in constructing railroads, or in mining or manufacturing, to settle with their laborers and employes at regular intervals, and pay them in lawful money of the United States, and to punish a violation of same." 1887—"To prevent joint stock companies, associations, and corporations, organized or chartered under the laws of this State, from impairing or infringing upon the rights, privileges, and liberties of their servants and employes." 1887—"To protect miners in the coal and mineral regions of the State." 1889—"To protect employes in the selection of their family physician." 1887—"For the relief and protection of workingmen in the purchase of store goods and supplies." 1887—"To provide a more just and equitable mechanics' lien law, and to afford mechanics, contractors, sub-contractors, and material men greater security for work done and material furnished." 1883—"To protect employes and day laborers of corporations and partnership firms against the insolvency of such corporations and firms." 1881—"To provide for the ventilation of coal mines and collieries, and the protection of human life therein of the State of Tennessee." 1893—"To make it unlawful to employ a child less than 12 years of age in workshops, mines, mills, or factories in this State."

We present the following in reference to the various labor organizations in the State.

BUREAUS OF LABOR STATISTICS, OR KINDRED OFFICES OR DEPARTMENTS ESTABLISHED IN UNITED STATES.

STATE.	NAME OF BUREAU.	When Organized.	REPORTS.	CHIEF OFFICER.	ADDRESS.
United States	Bureau of Labor	1885	Annual	Carroll D. Wright	Washington, D.C.
Arkansas	Bureau of Mines, Manufactures and Agriculture	1889	Biennial	W. G. Vinchenheller	Little Rock.
California	Bureau of Labor Statistics	1883	Annual	E. L. Fitzgerald	San Francisco.
Colorado	Bureau of Labor Statistics	1887	Biennial	W. H. Klett	Denver.
Connecticut	Bureau of Labor Statistics	1873	Annual	Samuel B. Horn	Hartford.
Idaho	Bureau of Immigration, Labor and Statistics	1890	....	Commissioner of Labor	Boies City.
Illinois	Bureau of Labor Statistics	1879	Biennial	George A. Schilling	Springfield.
Indiana	Bureau of Statistics	1879	Biennial	Simeon J. Thompson	Indianoplis.
Iowa	Bureau of Labor Statistics	1884	Biennial	W. E O'Bleness	DesMoines.
Kansas	Bureau of Labor Statistics	1885	Annual	W. G. Bird	Topeka.
Kentucky	Bureau of Agriculture, Labor and Statistics	1876	Biennial	Nicholas McDowell	Frankfort.
Maine	Bureau of Labor Statistics	1887	Annual	Samuel W. Matthews	Augusta.
Maryland	Bureau of Industrial Statistics	1884	Annual	A. B. Howard, Jr	Baltimore.
Massachusetts	Bureau of Statistics of Labor	1869	Annual	Horace G. Wadlin	Boston.
Michigan	Bureau of Labor and Industrial Statistics	1883	Annual	Charles H. Morse	Lansing.
Minnesota	Bureau of Labor	1887	Biennial	L. G. Powers	St. Paul.
Missouri	Bureau of Labor Statistics and Inspection	1879	Annual	Lee Meriwether	Jefferson City.
Montana	Bureau of Agriculture, Labor and Industry	1893	Annual	James H. Mills	Helena.
Nebraska	Bureau of Labor and Industrial Statistics	1887	Biennial	J. H. Powers	Lincoln.
New Jersey	Bureau of Statistics of Labor and Industry	1878	Annual	Charles H. Simmerman	Trenton.
New Hampshire	Bureau of Labor	1893	Biennial	John W. Bourlet	Concord.
New Mexico	Bureau of Immigration and Industrial Statistics	1891	....	Max Frost	Santa Fe.
New York	Bureau of Labor Statistics	1883	Annual	Thomas J. Dowling	Albany.
North Carolina	Bureau of Labor Statistics	1887	Annual	B. R. Lacy	Raleigh.
North Dakota	Department of Agriculture and Labor	1890	Biennial	A. H. Laughlin	Bismarck.
Ohio	Bureau of Labor Statistics	1877	Annual	W. T. Lewis	Columbus.
Pennsylvania	Bureau of Industrial Statistics	1872	Annual	James M. Clark	Harrisburg.
Rhode Island	Bureau of Labor Statistics	1887	Annual	Henry E. Tiepke	Providence.
South Dakota	Department of Labor and Statistics	1890	Biennial	S. A. Wheeler	Lead.
Tennessee	Bureau of Labor, Statistics and Mines	1891	Annual	F. P. Clute	Nashville.
Texas	Bureau of Agriculture, Insurance, Statistics and History	1876	Annual	A. J. Rose	Austin.
Utah	Bureau of Statistics	1890	Annual	Joseph P. Bache	Salt Lake City.
Wisconsin	Bureau of Labor Statistics	1883	Biennial	Halford Erickson	Madison.
West Virginia	Bureau of Labor	1889	Annual	John M. Sydenstricker	Charleston.

LABOR ORGANIZATIONS IN NASHVILLE, TENN.

Trades and Labor Council (composed of three delegates from the different labor organizations of Nashville)—W. T. Dukehart, President; Ben Ashner, Secretary, 463 North College Street.

Typographical Union No. 20—John A. Aul, President; M. L. Ford, Secretary, 412 Main Street.

Coopers' Union No. 20—J. M. Harvison, President; John L. McFadden, Secretary, care Andrews's Cooperage Works.

Retail Clerks' Union No. 38—J. M. Johnson, President; Chas. Cooper, Secretary, 204 North Cherry Street.

Cigarmakers' Union—A. J. Blair, President; Wm. H. Diehl, Secretary, D. Levy's Cigar Factory.

Rock City Division, Brotherhood of Locomotive Engineers—Alex. D. McTolmie, Secretary, 1800 Broad Street.

Molders' Union No. 55—Alex. Edwards, President; M. A. Taft, Secretary, Highland, near Farrell Street.

Federal Labor Union, affiliated with the American Federation of Labor—W. J. Gore, President; W. A. Sears, Secretary, Journal of Labor Office.

Peter Burns Lodge, Brotherhood of Locomotive Firemen—M. L. Tindell, Secretary, Stockell and Josephine Streets.

W. H. Thomas Lodge Brotherhood of Locomotive Firemen—Wm. Porter, Secretary, Church, near Addison Street.

Painters' Union No. 274—W. H. Kiger, President; J. A. Sharp, Secretary, Journal of Labor Office.

Hodcarriers' Union—Edward Granberry, Secretary; Keeble Hall, North Spruce Street.

Shoemakers' Union—Thomas Hallam, President; Peter Suraud, Secretary, Parrish & Mason's Shoe Factory.

Carpenters' Union No. 766—A. S. Welland, President; E. Piper, Secretary, 902 Woodland Street.

Brewers' Union—Carl Gerst, Secretary, 910 South High Street.

Pressmen's Union—John W. Gower, President; Jesse Johnson, Secretary, American Office, or 908 South College Street.

Barbers' Union—J. A. McClendon, President; George Rucker, Secretary, 703 South Spruce Street.

Tailors' Union No. 85—Jacob Geiger, President; C. A. Bowman, Secretary, care Journal of Labor Office.

Car Inspectors' Union—Arthur Burchill, Secretary, 1626 State Street.

In March, 1894, a number of workingmen formed Nashville Assembly No. 379, Knights of Labor, but after an existence of about eight months the Assembly disbanded.

It is understood from good authority that the machinists, electrical workers, blacksmiths, plumbers, harness-makers and bricklayers will reorganize in the near future.

LABOR ORGANIZATIONS IN MEMPHIS.

Trades and Labor Council—W. A. Brannen, President; W. O. Pinard, Secretary, 353 Front Street.

Journeymen Barbers' Union No. 36—Adam Goldfuhs, President; O. N. Kuster, Secretary, P. O. Box 109.

Bricklayers' Union No. 1—James Handly, President; J. W. Richens, Secretary, 132 Pontotoc Street.

Brotherhood of Railway Carmen—J. D. Simmons, Secretary, 15 Exchange Street.

Knights of Labor Assembly No. 471—Edward Finley, Secretary.

Journeymen Horse-shoers' Union No. 38—J. R. O'Neil, President; John Lowrey, Secretary, 66 Monroe Street.

Iron Molders Union of North America No. 154—G. A. Vogt, President; H. M. Easley, Secretary, General Delivery.

International Association of Plumbers, Steam and Gas Fitters No. 17—Sol Rhodes, President; James Haley Secretary; No. 77½ High Street.

Brotherhood Carpenters and Joiners—T. J. Tustin, President; J. A. Reid, Secretary, 34 Adams Street.

Cigarmakers' International Union No. 266—Louis De Haan, President; L. Einbaum, Secretary, 212 Beale Street.

Brotherhood Saddle and Harness makers—George Pratt, President; W. R. Curd, Secretary, 89 Monroe Street.

Hackmen's Union No. 1—Harry Jerome, President; A. M. McKee, Secretary, 36 Poplar Street.

Coopers' Union No. 32—William Blake, President; Joe Walsh, Secretary, 26 Virginia Avenue.

Hodcarriers' Union No. 1—Alex Hill, Secretary, General Delivery.

International Association of Machinery Molders—James Wiley, Secretary, 120 Penn Avenue.

International Association of Machinists No. 14—Thomas Jackson, Secretary, 311 Georgia Street.

Tin, Sheet-iron and Cornice-workers's Union No. 4—G. E. McLendon, President; J. Denson, Secretary, 162 Union Street.

Typographical Union No. 11—G. C. Sawtelle, President; E. C. Brookshire, Secretary, 26 Deane Avenue.

Bluff City Association Steam Engineers—W. S. Calister, President; W. P. Reed, Secretary, Desoto Street.

Brotherhood Locomotive Engineers—J. Fuch, Chief Engineer, 16 Jackson Avenue.

Brewers' Union—Chas. Luther, Secretary, 216 Tennessee Street.

Pressmen's Union No. 18—J. E. Tucker, President; C. B. Sowers, Secretary, 18 Bradford Street.

Stonecutters Union of North America—William Haley, Secretary, General Delivery.

Journeymen Tailors' Union No. 79—Aug. Borgman, President; Ed Lind, Secretary, 35 Madison Street.

LABOR ORGANIZATIONS IN KNOXVILLE, TENN.

Enterprise Assembly No. 4845, Knights of Labor.

Eureka Assembly No. 4695, Knights of Labor.

Star Assembly No. 4608, Knights of Labor.

Stanton Division No. 139, Railway Conductors.

Carpenters' and Joiners's Union No. 225.

Central Labor Union of East Tennessee.

Cigarmakers' Union No. 261—W. J. Henshall, Recording Secretary.

Typographical Union No. 111.

TRADES AND LABOR COUNCIL OF NASHVILLE.

(Composed of three delegates from the different trades organizations in Nashville.)

Possibly no other single body of organized labor has exerted a greater influence for the cause of labor throughout the State of Tennessee than has the Central Labor Union (as it was formerly called), or the Trades and Labor Council (as it is now called).

Six years ago labor unions were scarcely known in the city of Nashville, save the Typographical Union, Molders' Union, and possibly one or two other unions. But when the *Evening Herald* discharged its union printers and engaged non-union ones to take their places, it was then that the Business Committee of the Typographical Union issued a call for representatives or delegates of the four or five unions then existing to meet at the old Olympic Theater and endeavor to form a central body. The delegates met, and believing that an injury to one is the concern of all, formed a central body, with Mr. Andrew Newell, of Iron Molders' Union No. 55, as President, on August 24, 1890, and took out a charter under the American Federation of Labor. At this time the publication of the *Journal of Labor* was commenced, and the Central Labor Union indorsed it as its official organ.

To the Central Labor Union chiefly should be given the credit of agitating and pressing to a successful conclusion, through its Legislative Committee, all State laws enacted relative to labor during the past six years. The child labor law, the barbers' Sunday closing law, etc., resulted mainly through the efforts of this body.

The objects and aims of the Central Labor Union (now Trades and Labor Council) are clearly set forth in its platform of principles, among which are pleas for higher wages, in order that the laborer may be enabled to purchase the necessaries of life; shorter hours of week-day toil and absolute Sunday rest, in order that the toiling masses may have time for recreation, reflection and study, and through these means become better citizens; to remove children under 15 years of age from the hard and straining ordeals of factory and workshop labor by compelling them to attend school, and thereby giving them at least the rudiments of an education to enable them to enter into the combats of life not altogether handicapped. For these and other reasons, the central body has a legislative committee, whose duty it is to impress upon the law-making power the justice and necessity of legislation in favor of labor.

In addition to the good work done by this body through the different State Legislatures, several municipal ordinances, highly beneficial to labor, have been urged and passed, viz., prohibiting the working of convicts on municipal works, prohibiting barbering from being carried on in the city of Nashville on Sunday, and compelling city contractors to pay their employes off in legal money.

The constitution of the Central Labor Union was revised June 9, 1895, and its name changed to "Trades and Labor Council." The Council has about twenty unions affiliated with it, composed of all classes of wage-workers, irrespective of religion, politics, race or nationality.

Fewer strikes and lockouts have occurred under the guidance of this body than under any similar one of its size in the United States. This is true from the fact that a conservative spirit, based upon what is just and equitable, and guided by the principles of true trades unionism, has enabled it to speak successfully to the contending forces and say, "Come, let us reason together." The Council has at all times commanded the respect and confidence of all with whom it has dealt and of all to whom it is known. Its aims are in comformity with law.

JOURNEYMEN BARBERS' UNION NO. 79, OF NASHVILLE, TENN.

The business of barbering in Tennessee is by no means a small concern. It is engaged in by over two thousand persons, representing all classes of citizens in all its various forms, from the old stool and pan-lather operation to the finest parlors and best workmanship that money and unceasing practice can produce.

As civilization advances customs and habits change; tastes to suit the public appetite increase, and laws, from necessity, multiply. The slavish custom of fifteen hours week-day work, with little or no rest on Sunday, could not keep pace with the material progress and enlightenment which the State was undergoing. Though a large majority of barbers have always been opposed to Sunday labor, yet on account of sharp competition, which naturally strains the relations of trade and infuses into it a spirit of selfishness, it was seldom, even in the smaller towns, that mutual agreement could be reached among the barbers to close their shops on Sunday, and enjoy the blessing of one day's rest out of seven.

When labor began to be organized throughout the State it produced a more friendly feeling among the different crafts, which resulted, on the part of the barbers, in laws abolishing Sunday work.

The Acts of 1887, making it a misdemeanor "for any one engaged in the business of a barber to shave, shampoo, cut hair, or to keep open his bath-rooms on Sunday," was declared unconstitutional, and justly so, for two reasons: First, of duplicity, in that it embraced two distinct subjects, to wit: "barbering" and "bathing," in violation of Article II., Section 17, of the State Constitution; and second, on the ground of class legislation, in that it permitted persons other than barbers to operate bath-rooms on Sunday, while barbers were prohibited, thus the title being "barbering" and the subject in the body of the act being "barbering" and "bathing" both, and as these terms are not synonymous or convertible, the law therefore failed to stand the test of the Supreme Court.

Though the Legislature of 1887 made an error in what it hoped would be beneficial to the barbers of the State, yet the Legislature of 1891 corrected that error by framing a law prohibiting the carrying on of barbering on Sunday, which not only met the tests of the courts, but won the approval of other States and has been made a part of the laws thereof.

Through the activity of organized labor the City Council of Nashville (the bill being introduced and championed by Hon. Charles Sykes) enacted a law similar to the State law, imposing a fine of not less than $5.00, nor more than $50.00, upon any person found guilty of barbering on Sunday.

The average wages received by barbers in this State is $8.50 per week. Of course this rate is based upon estimates made in different counties, and includes the average made by barbers who work under the percentage system. The average number of hours is 14. Statutory enactments are based, as a rule, upon moral law, and when we consider that the barbers a few years ago labored fourteen hours daily and about eight hours on Sunday, the masses should hail with delight any law which would enable them to have their Sunday rest. It can be said, to its eternal credit, that organized labor was the prime mover in having the Legislatures of 1887 and 1891 enact laws closing up barber shops on Sunday, and also to keep the same from being repealed. It can also be said, though in sorrow and disgust, mingled with deep regret, that some of the ministers, notwithstanding the sanctity with which they are supposed to be clothed, though urgently requested, did not raise their voices in defense of Sunday rest in the perilous hours when the enemies of Sunday rest were bombarding our legislative citadel with the hope of tearing from our statutes that law which is in conformity with moral teachings and approved by the better element of barbers throughout the State. "Hallow the Sabbath day to do no work therein."

The barbers in the city of Nashville were organized in 1891 with two large unions. Though the Sunday closing law was already in force, yet they found their hands full in trying to bring about several much-needed reforms of a local nature; they had the State law made a part of our municipal law; they induced the proprietors to charge living prices, in order to enable them to pay living wages and to close their shops at 8 o'clock, Saturday's excepted.

Believing that all the good things for which they were organized had been achieved; knowing that through their efforts they had accomplished Sunday closing, 8 o'clock closing and living wages, and being unmindful of the fact that to hold and maintain that which has already been accomplished, it is necessary to remain organized, many of the barbers abandoned the ship of unionism became careless and indifferent as to the approaching dangers until the result is that prices for work are shattered into tatters—many shops which heretofore charged 15 cents for shaving and 35 cents for hair cutting now do the same work for 10 and 25 cents, respectively; and many who had been charging 10 cents for shaving and 25 cents for hair-cutting now charge 5 and 10 cents, respectively. These shops are growing numerous, and are spreading themselves over the State, not only to their own disadvantage, but to the disgust of those who hope to raise the dignity of their calling. When the barbers of Nashville (both white and colored) were thoroughly organized only one "cut-rate" shop was in existence, and as the unions gradually decreased in membership the "cut-rate" shops with equal graduation increased in numbers. These "cut-rate" shops are composed very largely of inexperienced workmen. Men and boys who, having served a few months as porters or boot-blacks, don a working jacket, get in those "cut-rate" shops and style themselves "tonsorial artists." Again, the cheap material used in these "cut-rate" shops, and the frequent and oft-repeated use of the same towel, without allowing it to go through the necessary process of some laundry, makes it dangerous (if the germ theory be true) for those who come in contact with them, to say nothing of the pain and peril which the customers undergo.

Again, the so-called "barber schools," recently established in some of the larger cities, which undertake, in consideration of $30, to learn a person within six weeks to become a "full-fledged barber," is a great imposition upon the profession. The students of these schools, when they "graduate," are given a diploma or certificate setting out in fabricating words that the bearer is a competent workman, skilled, swift and proficient in the art. These graduates invariably find a position in the cheap shops. There could be no objection to these barber schools if the students were required to remain there long enough to be efficient and become full-fledged artists in the truesense of the word; for if such was the case the graduates of those schools could and would command positions in first-class shops that charge first class prices and pay first-class wages.

These are the order of things which the Journeymen Barbers' International Union is trying to bring about, and with success; for in those localities where labor is organized it becomes watchful and mindful of its rights, and while 10 cents for shaving and 25 cents for hair-cutting and other work in proportion, are within themselves too low, yet it depends upon the barbers, and the barbers alone, to see that the prices for work do not drop lower and the number of hours of work does not increase. If some future Legislature of the State should enact a law requiring barbers to be licensed by some duly authorized officers before they are permitted to work at the trade, it would heighten the dignity of the art, remove many of the perils and appease many pains.

H. B. Cheairs,
Journeymen Barbers' Union No. 79.

CARPENTERS' UNION NO. 766, OF NASHVILLE, TENN.

Carpenters' Union No. 766, of the Brotherhood of Carpenters and Joiners of America, was organized Feb. 17, 1890, with twenty charter members. The union rapidly increased in membership until at one time over four hundred members were enrolled and, notwithstanding the hard times, has held its own remarkably well. The United Brotherhood of Carpenters and Joiners of America, with which the local is affiliated, was organized in Chicago August 12, 1881, with twelve local unions affiliated and 2,042 members, and at the present time, fifteen years later, it has 815 locals, which represent over 40,000 members. It is organized to protect the carpenters' trade from the evils of low prices and botch work; its aim is to encourage a higher standard of skill and better wages; to re-establish an apprentice system, and to aid and assist the members by mutual protection; it pays a funeral benefit to each member of from $100 to $250, and in case a member's wife dies pays from $25 to $50 benefit; it also pays a disability benefit from $100 to $400. During the past year $72,613 was expended for these benefits, while $452,000 was spent by the different locals for sick benefits. The Brotherhood is also a protective trade union as well as a benevolent society. It has raised the wages in 531 cities, and placed $5,500,000 more wages annually in the pockets of the carpenters. In fifty-nine cities it has reduced the number of working hours to eight, and in 421 cities to nine hours, while 332 cities have established the eight or nine hour system on Saturday. By this means 11,150 more men have gained employment. I attribute this result to thorough organization. Very few strikes have occurred during the past year, and very little money has been spent by the Brotherhood.

Very respectfully,
W. T. DUKEHART,
Carpenters' Union No. 766.

PAINTERS' UNION NO. 274, OF NASHVILLE, TENN.

Local Union No. 274, of the Brotherhood of Painters and Decorators of North America, was organized October 16, 1895, with twenty charter members. Since then the organization has increased its membership to forty, and in a short while hopes to have every journeyman painter in Nashville within its fold. The organization is growing very rapidly, applications for membership being received at each meeting. The average wages of painters is about $12 per week, ten hours per day.

The following are the officers for the year 1896: President, W. H. Kiger; Vice-president, J. A. Haslup; Recording Secretary, J. A. Sharp; Financial Secretary, C. P. Owens; Treasurer, J. M. English; Conductor, F. Baker; Warden, J. B. Girard; Trustees, J. A. Sharp (six months), J. A. Haslup (twelve months), Sam Ferguson (eighteen months.)

The union meets every Monday night in the *Journal of Labor* office.

Very respectfully,
J. A. SHARP,
Recording Secretary Painters' Union No. 274.

TYPE-SETTING MACHINES.

(By John J. Straub, of Typographical Union No. 20, Nashville, Tenn.)

Type setting by machinery. Imagine the exclamations of amazement that would be uttered by either Guttenberg, Faust, or even our own Benjamin Franklin, should they awake from their slumbers and walk into a modern newspaper office, or one of the scores of book and job printing offices in this broad land which are using machines—each one capable of turning out 10,000 or 15,000 characters per hour, without the use of types, responding to the deft touch of the skilled operator by dropping down a miniature mould; then when a sufficient number are alined in the proper place, carrying them into a casting-box, to be distributed automatically a moment later, while the product—in the shape of a solid line of type—slides out into a stick; the operator in the meanwhile preparing another line for a similar journey.

But these fathers of the "art preservative" would not be the only awe-stricken members of the craft on beholding for the first time the most wonderful piece of machinery in existence. No longer than a decade ago a mention of a type-setting machine invariably brought a smile of incredulity to the countenance of the "knight of the stick," who felt secure in the oft-repeated argument of the hand compositor—that we would have a type-setting machine whenever a man could be found who could put brains into iron and steel and make it responsive to his will.

But they are here, and the wise compositor turns his attention to the mastering of the machine, and in a few years who can presume to predict that they will not prove a blessing in disguise, such as the sewing machine, cotton-gin, and numerous inventions that have superseded crude hand work.

But the object of this sketch is to state the results attending the change from hand to machine composition, mainly as applies to the workman. Experience has shown that in a newspaper office ten machines can set as much type as thirty-five or forty men could by hand, which, of course, cheapens the cost of getting out a newspaper, but it is noticeable that nearly all of the newspapers adopting machines sooner or later take to using more matter, and at the present rate of progress, so far as the size of papers is concerned, it is very probable that the printers of the United States will in a few years receive as large a sum total in wages as before the introduction of machines. But, in the meantime, there is no denying the fact that many printers are added continually to the already large army of the unemployed.

How do those who are fortunate enough to become operators fare as to wages, compared with the average salary of the old-time hand compositor? A close examination of numerous scales of prices reveals the fact that the machine operators generally are paid a little more than hand compositors, and, as a rule, work a fewer number of hours.

In Nashville the scale of prices for day work by hand is $18 per week for fifty-nine hours, while daily newspapers were all set by the piece, the workmen on evening papers averaging about $2.75 and on morning papers about $3 per day. Now the machine scale is $3 for day work and $3.50 for night work, eight hours constituting a day.

But the Nashville publishers are afforded the option of paying by day or by the piece, and it has been shown where tried that by the latter method the operators succeed in making an average somewhat above the scale.

Memphis, Chattanooga and Knoxville daily papers are also equipped with type-setting machines, and it is a conservative estimate to state that one-half of the newspaper compositors in the four larger Tennessee cities have been displaced by them.

Up to the present, the book and job printer has not been molested to any great extent by the machine, which was primarily intended for newspaper work, but where they have been tried on book work they have apparently given satisfaction, uniform spacing, and a new face always, being two great factors in favor of the machine type.

Another thing that keeps alive hope in the struggling printer's breast is the theory that cheaper composition will naturally result in newspapers springing up, and that eventually all will again find employment.

But on the other hand, it is asserted, and apparently with good foundation, that the machine has by no means attained the perfection that awaits it, and it remains to be seen whether or not those now seeking work will find it or whether the ranks of the unemployed will be further augmented by the "manipulators of the silent messsengers of thought."

STRIKES IN 1895.

COOPERS' STRIKE, NASHVILLE, TENN.

Coopers' Union No. 20, at a meeting held Tuesday night, September 17, 1895, in Twin Hall, Nashville, Tenn., refused to accept a reduction in wages demanded by the bosses and mill-men. The men and proprietors met jointly, endeavoring to settle the wage question, but as the bosses insisted on a reduction, an agreement was impossible. The coopers had been working (under contract) since September, 1894 (the contract expiring September, 1895,) for 10 cents and 12 cents per barrel, which the coopers claim is one-half cent lower than the old scale.

The number of men involved was about 115, and were employed in the shops of R. Wernet, M. L. Andrews and C. H. Mocker.

The coopers prepared the following card, which was published in the press of Nashville, September 24th, 1895:

"After having spent three weeks in an attempt to arbitrate the differences existing between the cooper bosses and mill-men, and after having been locked out one week, the Coopers' Union has ordered a strike against a reduction of two thirds cent per barrel in their present scale of wages. The shops of R. Wernet, C. H. Mocker and M. L. Andrews are involved. The number of men called out by the Union was 115.

"The cause leading to this trouble originated in a failure of the flouring mills to fulfil promises made to the coopers eighteen months ago.

"The managers of the mills of the city and the above mentioned cooper bosses came before the Coopers' Union in March, 1894, at the time when the country was suffering from business depression on every hand, when banks were going to pieces, and asked upon these grounds that the Union grant them 1 cent reduction per barrel for six months, and promised to restore our wages to us at the expiration of the six months. They only restored one-half of the amount.

"The Union entered into a contract on the 10th of September, 1894, to work twelve months for 10 and 12 cents per barrel, which was one-half cent below the old scale. This contract was faithfully kept by the Union, and when it expired business confidence was restored throughout the country. Factories, mines and mills all over the land were restoring the wages of their employes that had been reduced during the stress of business depression, and in a great many instances were restoring the former wage rate voluntarily.

"In the face of these facts, and notwithstanding their promise which was accepted by the Union in good faith, at the expiration of the contract the Union asked to have their old scale of 10½ and 12½ cents per barrel restored; but after a full discussion of the matter, determined to demand 10 and 12 cents per barrel. And upon this proposition and against any reduction the Union stands pat."

The Executive Board of the coopers took charge of the strike, and visited every labor organization in Nashville and asked assistance, which was readily given—by resolution and moral support. They also visited the retail merchants, and requested them to refrain from handling the products of the Cumberland and Liberty mills. Mr. M. L. Andrews, president of the Andrews Cooperage Works, in the meantime having agreed to pay the scale, the coopers (about 35) returned to work, and the Model Mill, which buys all its barrels from the Andrews Cooperage Works, was not included in the boycott.

On September 26, 1895, the Executive Board of the coopers had the following circular printed and distributed:

"*To Organized Labor Everywhere—Greeting:*

"The locked-out coopers of Local Union No. 20, of the C. I. U., appeal to organized labor, their friends and the public not to use flour packed in barrels made by cheap labor. The managers of the Cumberland and Liberty mills, of Nashville, Tenn., promised the journeymen coopers in 1894 that if they would accept a reduction during the hard times then existing, they would restore prices when business conditions improved.

"The coopers acceded to this request, but now when business conditions have improved, the mills decline not only to fulfil their agreement, but by concert of action with the cooper bosses, are endeavoring to force us to work for a still greater reduction by importing cheap labor from other States. The cheap prices offered us for our labor are not adequate to enable us to properly and decently care for our families, and we are therefore refusing to work for the bosses unless they will pay us reasonable prices.

"Since the lock-out the Cumberland Mills, as we are reliably informed, have been using second-hand barrels or packages.

"We appeal to the public and our sympathizing friends to aid us and bestow upon us their sympathy and co-operation, by patronizing only those brands of flour which are packed in union barrels.

"The coopers are endorsed by the Trades and Labor Council and all labor organizations of Nashville.

"We don't patronize the Cumberland or Liberty mills' brands of flour, which are as follows:

"Cumberland Mills brands are: Granona, Tube Rose, Justice, Luxury, Cream, Oven Lifter, Harvest King, Sunny South, Union, Marine, Canopy, Lame Miller.

"Liberty Mills brands are: Leonte, Majestic, Monarch, Verona, Nordyke, DeSoto, Little Beauty."

After the above circular appeared, a bill was filed by the Perfection Barrel & Stave Company against Coopers' Union No. 20, of the Coopers' International Union, and includes the names of J. M. Harvison, President; C. A. Hawkins, E. Nichol, F. B. Johnson and J. Snorter, members of the Executive Board of the Coopers' Union. The bill states that about July 1, 1895, the complainant established a branch office and factory at 433 Chestnut Street, and equipped it with machinery of the newest pattern and design. There has lately been invented a machine for making barrels which grooves the ends of the staves ready to receive the head of the barrel, and in all things perfects the stave so that it is ready for use in making the barrel when turned out by the machine. These machines were used, and largely reduced the work of finishing up a barrel. The formation of Local Coopers' Union is recited "to regulate and control the internal administration of all cooperage establishments, so far as relations between the coopers and their employes are concerned, and particularly to dictate the scale of prices which shall be paid to the journeymen coopers. The local union is alleged to never have been incorporated. The names of its members are too numerous to be procured or recited. When the factory was established they tried to get union coopers to work in it, but failed because the Union demanded that, despite the improved machinery, the same price be paid as for barrels made by hand. The Union, later, declined to permit the use of the machines because it was a labor-saving device. Complainant thereupon employed other workmen, who were not members of the Union, and has built up a large trade, among its best customers being the Cumberland Mills and Liberty Mills, makers of flour on a large scale. Business so increased that more workmen were needed, and, being unable to employ a sufficient number of competent coopers in Nashville who were not members of the Union, they sent to Louisville and employed three, who came and went to work with the agreement that if the conditions were satisfactory there would be fifteen more come. The conditions were found satisfactory, but a short time after their arrival in the city a committee from the coopers visited them, who notified them that they must quit work or take a whipping. Complainant advertised in the papers of other cities, where there were unemployed coopers, and could get plenty of workmen if they were left alone; but a committee from Local Coopers' Union meets every train, and either induces them to go back or threatens them and prevents their going to work. They told complainant that force and intimidation to the extent of bloodshed will be used to prevent coopers going to work. Complainant pays the way of workmen to Nashville, and the committee takes the workmen and sends them back. In addition to all this, the Coopers' Union is endeavoring to destroy complainant's business by threatening to boycott all who buy goods from complainant, and had two circulars printed, which they threw all over the city, advising a general boycott of all the goods sold by certain firms if they dealt in goods manufactured by those who patronize complainant. An unlawful conspiracy is alleged between the defendants and certain parties unknown to destroy the business of complainant by intimidating and preventing their laborers working, and by attempting to prevent customers dealing with complainant. This has been going on for weeks, and they threaten to continue unless complainant abandons his improved machinery and employs union men at prices to be fixed by them. The damages so sustained will not be susceptible of computation and could not be collected, as the Union has no assets and is insolvent, and nothing can be collected from them by process of law. An injunction is the only remedy.

The court is asked to enjoin local union and the members thereof from further inducing workmen to leave, or from preventing them going to work, and from carrying on their boycott against its customers, and from doing any of the things named, which tend to the injury of complainant. The injunction was granted by Chancellor Malone.

Wednesday, October 9, 1895, J. M. Harvison, President, and the other officers of the unincorporated association of Coopers' Union No. 20, filed their answer to the bill filed against them by the Perfection Stave & Barrel Company. They insist that their object is to assemble peacefully at stated times, and to protect and promote the rights and interests of members and their families and for that purpose co-operate under conservative and legal rules. They deny the legal existence of complainant as a corporation, no charter being on record. They do not know the workings of the machinery he speaks of, but know that it is not satisfactory to the trade and does not justify the reduction he speaks of in wages. They affirm that the wages he speaks of are starving wages, and that no man whose desire is to make an honest living for his family can afford to work for them. In March, 1894, during the depression, the coopers agreed to work for less wages, and at the expiration of the six months named in the contract the wages were only partially restored. After a year they asked a restoration, and it was refused, as was also a modified proposition. Then there was a lock-out. They deny all allegations of violence, threats, intimidation and unlawful conspiracy, or that they have caused or endeavored to cause by violence any employes to quit the service of complainant, or that they have so prevented any from entering his service. All that they have done, they claim, was in pursuance of their rights as citizens and lawful means to protect themselves and their families against oppressive measures. They aver that if any workmen left complainant's employ or refused to enter it it was of their own volition and with a full knowledge and understanding of what they were doing. The answer denies any knowledge of the employment of coopers in Louisville by complainant; denies that they were told to leave the city or there would be bloodshed; assert that when the men learned that their would-be employer had concealed from them the fact that there was a lock-out in Nashville they did not feel bound by their contract and returned home. It is denied that men employed at the Cumberland Mills were ordered to quit or take a whipping by defendants or by any one authorized to do so by them. They deny any conspiracy, intimidation, or that they have kept any one from buying his barrels, or done anything else contrary to law or good conscience. Defendant Hawkins takes the sole responsibility for the circulars, and denies that there is anything illegal in them. Affidavits are filed to show that the men brought here on the train did not know when they came there was any trouble with the coopers, and that they were deceived by misleading advertisements in coming.

The cause came on to be heard before the Hon. Thomas H. Malone, Chancellor, the 10th day of October, 1895, to dissolve or modify the injuncion heretofore granted upon the coming in of the answer.

Whereupon, and upon argument of counsel, the court is pleased to order and adjudge that said injunction be, and the same is hereby, so modified as to restrain the defendants, their confederates and co-conspirators, if such there be, from doing any illegal acts in furtherance of an unlawful design to break up complainant's business, if such design exists; restraining them from forcibly or by threats and intimidation preventing other workmen from entering its employ; restraining them from forcibly or by threats and intimidation inducing persons or corporations not to buy the goods of complainant, or forcibly and by threats and intimidation inducing persons not to deal with or use the goods of persons dealing with complainant; restraining them from going about the factory or making demonstration in its neighborhood for the purpose of intimidating or threatening the workmen now in the employ of complainant, and cause them to leave complainant's employ by force, violence, threats or intimidation; restraining them from forcibly or by threats of violence or intimidation to molest the coopers whom complainant employs at a distance and brings to Nashville, and interfering with them by unlawful means, and thus preventing them from accepting employment with complainant.

In all other respects the injunction is dissolved, with leave to complainant to move for re-instatement at any time upon notice, and leave to defendants to move to further modify.

(It is understood from the attorneys for the defendant that they will in a very short time move to further modify the injunction.)

On September 28, 1895, Mr. R. Wernet, a boss cooper, published the following card in the Nashville American:

"We notice that the Coopers' Union published a statement in which they say that the average price earned by journeymen coopers last year was 85 cents per day. I am not prepared to state what the average would be, counting all the coopers that might happen to be in the city, some of whom were out of employment.

"I find from my books that for the twelve months ending September 11, I furnished the Liberty Mills with 144,830 flour barrels, and 38,738 half barrels. I paid for making them 10 cents for whole barrels and 7½ cents for half barrels, which amounts to a total of $18,356.07.

"I employed an average of thirty-five men on flour barrels for the Liberty Mills; also four or five men on tight work, produce barrels, etc.

"Leaving out legal holidays, counting 300 working days to the year, this would be an average of about $1.75 per day paid to each of my men working on flour barrels.

"Respectfully,

"R. **Wernet.**

In reply to this the coopers, on close figuring, published a statement that the amount paid out in wages by the M. L. Andrews' Cooperage Works, from September 8, 1894, to September 8, 1895, was $11,504.66; the average number of employes per day thirty-five; average wages per day $1.09. The coopers also claim that the M. L. Andrews Cooperage Works was greater than that of the other cooperage establishments.

At a meeting of Coopers' Union No. 20 held Tuesday, December 17, 1895, a communication was received from Mr. W. C. Myers, of the Model Mill Company, in which he declared from this time on no barrel that did not bear the union label of the Coopers' Internanational Union should ever come into the Model Mill.

TAILORS' STRIKE, NASHVILLE, TENN.

Tailors' Union, No. 85, of the Journeymen Tailors' Union of America, at a meeting held on Monday night, March 18, 1895, in Odd Fellows' Hall, Nashville, Tenn., declared a general boycott against Berry, Bailey & Co., merchant tailors, for refusing to sign the scale of prices. Messrs. Schray, Ulrich and Jones were appointed a committee to confer with Messrs. Berry, Bailey & Co., and endeavor to have them sign the scale. On Tuesday, March 19, 1895, the committee called on the firm, but they still refused to sign the scale, whereupon the Union appointed the following named committee to take charge of the boycott and use every lawful means to compel Berry, Bailey & Co. to sign the scale of prices: Messrs. Acton, Schray, Bunning, Loefler, Lefkovitz and Crone. The committee visited every union in Nashville, and secured endorsements of the boycott.

Wednesday, March 20, 1895, President M. J. Noonan published the following card in the *Nashville American* :

" Misleading statements having heretofore appeared in the daily papers of Nashville as to the cause and effect of the recent walk-out of the union tailors from the establishment of Berry, Bailey & Co., this means is taken to lay the facts before the public.

" Tailors Union at no time attempted to acquire the management of the business of any employer, and merely presented its scale to Berry, Bailey & Co. for their signature, as it did to all the other tailoring establishments of Nashville, in order that the men employed by Berry, Bailey & Co. might secure the same compensation for the various kinds of work as was paid elsewhere, and to do away with unjust competition, in which the journeymen tailor would be the sufferer.

" Berry, Bailey & Co. refused to sign the scale, and, after repeated efforts to induce them to do so, the local Tailors' Union, sanctioned by the international organization, called the men out.

"All the union men responded to the call, and the tailoring establishment of Berry, Bailey & Co. is endeavoring to delude the public into believing that they can turn out first-class work when their force of workmen consists only of three non-union men, all of whom are incompetent.

" Berry, Bailey & Co.'s scale is forty per cent. lower than that of any other house in the city, and it is plainly apparent to any fair-minded man that no competent workmen will be found by them to take the places of their late employes.

" [Signed] M. J. Noonan,

"*President Local Tailors' Union No.* 85."

In the meantime the union tailors were very active in boycotting the firm, and had a large number of tailors at the depots to meet the trains, and endeavor to persuade the non-union tailors who arrived not to go to work, and, in a number of instances, were successful. The outgrowth of this was the securing of an injunction by the firm, at 11:40 o'clock Wednesday night, April 3, 1895, restraining Jerome Jones and others from interfering with their business. The bill alleges that the defendants and their associates, confederates, allies and co-conspirators have endeavored in the last few days to break up complainants' business, to break up their contracts with employes, and prevent, unlawfully and oppressively, the employment of any new hands, except at their will and dictation; that they have tried to prevent contracts with complainants by parties who want clothes, all because complainants refused to allow the union to dictate wages, and settle all differences or changes in wages, without complainants being consulted; that their employes were induced to quit work, and that the union has been paying their wages.

They charge that this is a conspiracy to break up complainants' business, unless complainants' submit to all the union demands. Some of complainants' best workmen were non-union men, but the union wanted them discharged, but this was refused. They have maliciously prevented others from going to work for complainants, prevented workmen coming from other cities, etc. Five men whose railroad fare from Cincinnati was paid by complainants were sent away by defendants, who gave them money and railroad tickets; that defendants watch the trains and capture all hands coming to work for complainants and enticed them away; that the defendants are insolvent, irresponsible, and determined to continue their outrages.

The *fiat* for injunction was issued by Judge W. T. Smith, of the Fifth Circuit, who was at the Nicholson House.

Thursday morning, April 4, 1895, the *fiat* was served on the various defendants.

The paper was directed to Jerome Jones, Eugene Loefler, Elmore E. Acton, William F. Schray, Ike Lefkovitz, John Herman, M. J. Noonan, E. Bunning and W. F. Crone, as individuals and as officers and members of the Journeymen Tailors' Union of America No. 85. It recites the obtaining of an injunction from W. T. Smith, Judge, etc., enjoining them from coming about complainants' premises or into their workshop; from interfering with complainants, directly or indirectly, in their tailoring business; from interfering with their employes, and from enticing them away; from attempting to hire, or procuring them to be hired, or from being otherwise contracted for; from interfering in any way with complainants' hands employed or contracted for, while on their way to Nashville or to complainants' store, or on their way to report to complainants or after they have arrived in the city of Nashville; from conspiring to oppress complainants in their business; from boycotting and slandering them and their employes; from advertising, persuading or entreating any of complainants' employes to quit their service or not to hire to them. The defendants are, therefore, strictly enjoined and commanded, under penalty prescribed by law, of their "goods, lands and tenements to be levied to our use," that they, each and every one, absolutely desist from any of the acts mentioned.

The strike is still on.

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